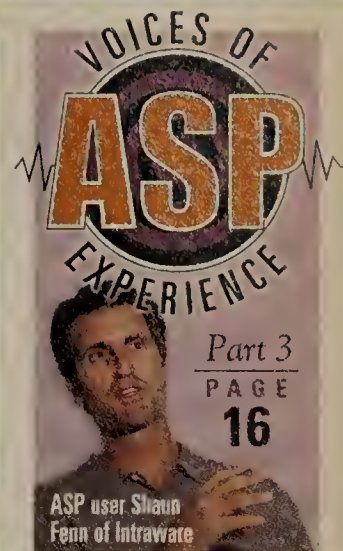




The leader in network knowledge

NetworkWorld



December 11, 2000

Volume 17, Number 50

The network portal: www.nwfusion.com

BUYER'S Virtual Private Networks GUIDE

FEATURE The VPN market
is looking up: The major network vendors are getting serious
about offering high-end enterprise-level products. **PAGE 74.**

REVIEW We test seven
VPNs for high-availability features. **PAGE 76.**

ONLINE Interactive Buyer's
Guide chart (www.nwfusion.com, DocFinder: 2123). VPN
service customers tell their stories (www.nwfusion.com,
DocFinder: 2151).

Cisco ups software ante

To spend billions on software for binding network hardware, applications.

BY JIM DUFFY

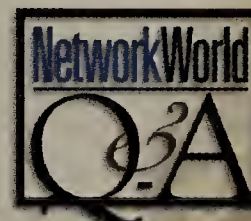
SAN JOSE — Cisco last week outlined a plan to invest billions in software that will let users better control voice, content, security and wireless services on their Cisco networks.

At its annual Worldwide Analyst Conference last week, Cisco executives said the plan to move higher "up the stack" will better enable Cisco to differentiate its products and boost its profit margins. The move could also pit the company against existing and potential business partners that jointly market their software products with Cisco hardware as members of

From the top

Cisco CEO John Chambers speaks out on:

- Competitors exiting the enterprise net market.
- The CLEC shakeout.
- Potentially competing with software partners.



EDWARD CALDWELL

Cisco's "ecosystem."

Specifically, Cisco plans to focus on service control and communications services software, code that acts as "middleware" to help bind network infrastructure more tightly to network applications. Call-routing middleware, for example, could gather information from multiple Oracle databases and deliver it to a call center agent.

"We will play in the middleware area," Cisco CEO John Chambers says. "We don't strategically partner and then compete, but there's a natural gray area where there will be overlap" with partners.

Added Mike Volpi, senior vice president and chief strategy officer: "Occasionally, we become a member of the

See **Cisco**, page 108

Domain name database revamp due?

BY CAROLYN DUFFY
MARSAN

Momentum is building within the Internet's technical and policy circles for an overhaul of one of the most important information services on the 'Net: the WHOIS database that lists owners of domain names.

Used daily by network professionals, trademark attorneys and law enforcement officials,

WHOIS is showing signs of disrepair. Since domain name registration became a competitive market two years ago, WHOIS has become harder to search because it no longer features a common data format. Once a tightly integrated database system, WHOIS is now a patchwork of information distributed among the 70 domain name registrars for .com, .net and .org, as well as 356 opera-

tors of country code top-level domains.

The decline in the quality of the WHOIS service makes it harder for companies to track cybersquatters. WHOIS searches
See **WHOIS**, page 105

www.nwfusion.com

YOU WHO?

Want to see how to search for Internet domain names? Check out this prototype for www.uwhois.com.

DocFinder
2137
find it online

SBC starving for DSL network space

BY DAVID ROHDE

CHICAGO — More than a year into a three-year, \$6 billion project to extend DSL availability to most of its territory, mega-Bell SBC is beseeching its customers to provide the remote-terminal space it needs to fulfill its high-speed network promise.

The move comes as SBC's Midwestern subsidiary, Ameritech, is only beginning to

install long-promised neighborhood terminals to extend DSL loop lengths, blunting SBC's claim to be moving faster than other Bells to solve persistent nationwide DSL availability and provisioning problems.

See **SBC**, page 106

DSL depression.
Three more DSL service providers hit the skids. **Page 14.**



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DECEMBER 11, 2000

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Chambers speaks out.

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Moral dilemmas and character-based ethics at work.

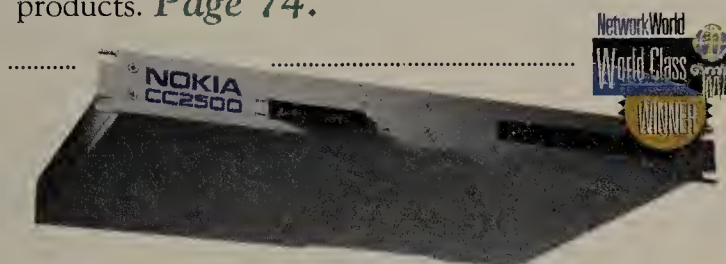
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REVIEW We tested VPNs from seven vendors for high availability. Nokia's CryptoCluster 2500 offered the best high-availability and load-balancing features. **Page 76.**

ONLINE Interactive Buyer's Guide chart (www.nwfusion.com, DocFinder: 2123). VPN service customers tell their stories (www.nwfusion.com, DocFinder: 2151).

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Virtues and vices: Character-based ethics help you navigate moral dilemmas that may arise in your career. **Page 87.**

Editorial: Top security vendors rise to our debate challenge. **Page 72.**

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THIS WEEK
ONLINE

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INTERACTIVE

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Having a tough time figuring out what to give friends and family for the holidays? The editors and writers of *Network World* have played . . . er, tested dozens of neat gadgets, gizmos and games to help you narrow down your decision. See what we had fun with and what we put back on the shelf. **DocFinder: 2140**

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RESEARCH

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We just updated our Wireless Research Center to include new and improved resource links. Use this area to learn more about the features of fixed and mobile wireless, the latest in wireless LANs and all the details of the Bluetooth specification. **DocFinder: 2138**

Working from home

Are you a home office dweller? Well, use our plethora of resources to help you stay linked to the home office. You'll find tips on how to set up your office, how to keep connected to the main office and how to stay ergonomically healthy. **DocFinder: 2139**

SEMINARS & EVENTS

State of the WAN

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COONEY'S CORNER

The best of the NetFlash daily newsletter



The DSL honeymoon's over

Is the bloom off the DSL rose? It certainly has wilted. The latest reason: Last Thursday, HarvardNet, a high-speed data communications company, said it would get out of the business of providing Internet access via DSL to focus on its Web-hosting service. The human toll of this decision was worse, mind you, as the company also said it would lay off 280 workers, or about 58% of its workforce (and in the true spirit of Scrooge, the company said 200 of those folks would be gone immediately).

The company received \$70 million in financing in one of the largest venture capital deals in New England last year, but just couldn't make do.

HarvardNet's woes are just part of an overall slide, as DSL companies are having trouble all over. Last week, DSL.Net announced it would lay off 141 employees, just four days after Covad Communications cut 400 jobs. And Verizon ended its merger agreement with DSL provider NorthPoint Communications, citing NorthPoint's deteriorating financial position and business operations as primary causes.

In any case, the DSL honeymoon's definitely over.

DocFinder: 2146

Sun bolsters cluster software

Sun this week rolled out server software that offers large-scale clustering capabilities for applications running on mail, Web or database servers. **DocFinder: 2153**

Cisco affirms its taste for small companies

Rather than making large acquisitions, Cisco will likely stick to its pattern of buying smaller, more focused niche companies, executives say. **DocFinder: 2154**

— Michael Cooney, associate news editor

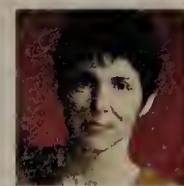
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COLUMNISTS

Telework Beat

On the way to the forum

Net.Worker Managing Editor Toni Kistner gathers remote workers around the virtual kitchen table to talk about home office issues. **DocFinder: 2142**



Compendium

Tales from the DSL hotline

Before you reach for the phone to call your DSL provider, stop and read this excerpt from a support call. **DocFinder: 2143**

Help Desk

Giving NetWare the SLP

Ron Nutter helps a reader add a NetWare server in another city to his directory tree. **DocFinder: 2144**

What is DocFinder?

We've made it easy to access articles and resources online. Simply enter the four-digit DocFinder number in the search box on the home page, and you'll jump directly to the requested information.

NEWS BRIEFS, DECEMBER 11, 2000

Intel joins chorus of warnings

U.S. chip giant Intel issued its second profit warning of the year last week, saying fourth-quarter revenue will be below expectations. Like many companies in the IT industry that have issued similar warnings, Intel blamed a slowdown in demand for PCs caused by a softening in the global economy. "Economies worldwide appear to be slowing more quickly than we had expected," Intel executive Andy Bryant said. Profit warnings from PC vendors and other businesses related to the PC industry have been flying fast and furious — first Gateway, then 3Com, Apple and Motorola.

San Jose, Seattle top tech survey

San Jose has the most high-tech employees, while Seattle's software talent seems to be making the most money, according to a study by the AeA, the former American Electronics Association, and Nasdaq. The study found that San Jose has 252,900 high-tech workers. Boston came in second with 234,800 workers, followed by Chicago with 180,400; Washington, D.C., with 177,700; and Dallas, 176,600. The cities with the highest high-tech employment growth during the past five years were Colorado Springs, 77%; San Francisco, 65%; Houston, 64%; Denver, 63%; and Sacramento, Calif., 57%. Seattle saw its average high-tech wage level in 1998

hit \$129,300. The wage was 50% higher than the high-tech wage of \$85,100 paid in San Jose. The Seattle high-tech average wage was 200% higher than the average wage in the private sector. Other high-tech wage levels included Middlesex, N.J., \$78,800; San Francisco, \$78,400; and Austin, Texas, \$76,300.

Healthcare ASP goes shopping

The TriZetto Group, an application service provider that serves the healthcare industry, announced last week that it acquired Resource Information Management Systems (RIMS) and expanded its service portfolio to include automated claims processing for benefits administrators. The RIMS QicLink software application will be added to dozens of other Internet-based applications designed for the healthcare industry and available from TriZetto for a monthly fee. TriZetto offers medical, financial, enterprise resource planning and customer relationship management applications for healthcare providers and insurance companies from software vendors such as InfoMedtric, Raintree Systems, and The Pen-Chart Corporation.

Nokia 'Ramps' up VPN line

Nokia is buying Ramp Networks to expand its VPN products to include equipment for small offices. The deal announced last week is expected to close early next year. Both companies already used firewall and VPN software made by Check Point Software on their VPN hardware, so interoperability between the two companies' lines will be relatively simple. Nokia plans to integrate management of Ramp gear with its VPN management software. Ramp had teamed with Check Point to develop a light version of Check Point Firewall-1/VPN-1 software for small-office VPN appliances. Nokia had focused on VPN gear for midsize and large corporate sites.

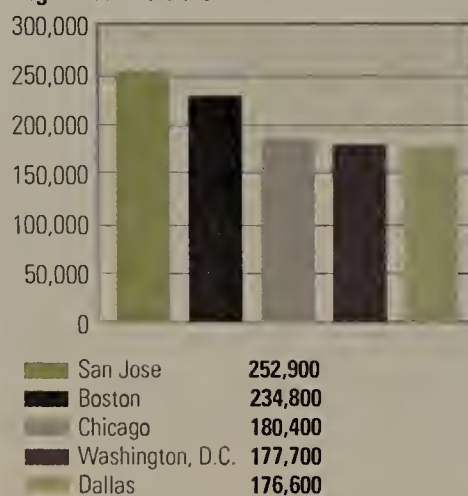
Ventro pulls plug on marketplaces

Another online marketplace is having troubles. Ventro last week said it would close its Chemdex life sciences marketplace and Promedix specialty medical products marketplace as the company refocuses from marketplaces to software and services. The Mountain View, Calif., company will cut approximately 235 jobs by March 31.

High-tech hangouts

When it comes to sheer numbers, San Jose boasts the largest high-tech workforce.

High-tech workers



hit \$129,300. The wage was 50% higher than the high-tech wage of \$85,100 paid in San Jose. The Seattle high-tech average wage was 200% higher than the average wage in the private sector. Other high-tech wage levels included Middlesex, N.J., \$78,800; San Francisco, \$78,400; and Austin, Texas, \$76,300.

Polycom buys Accord Networks

San Jose videoconferencing equipment

vendor Polycom last week snapped up Accord Networks, which makes network hardware for connecting disparate video systems. The deal was worth \$339 million. Already one of the leaders in the videoconferencing endpoint business, the purchase of Accord will help Polycom expand its reach into the enterprise network and let it offer hardware for connecting systems. Polycom already has a division that manufactures DSL aggregators for service providers and sees Accord's technology as the next step. Accord offers gateways for connecting H.323 (IP), H.320 (ISDN) and ATM-based systems as well as multipoint control units that connect multiple parties into one conference.

Sun's flawed tests delay Java certification process

BY JOHN COX AND KATHLEEN OHLSON

Some Java application server vendors say they have been hampered by hundreds of flaws in test programs that Sun provides to make sure these products use Java correctly and work with each other.

Some vendors gripe about wasting weeks struggling with unexpected bugs, while others report only minor problems. The products being tested form the foundation of enterprise Web commerce sites.

Sun engineers patched an unknown number of the almost 6,000 test programs, and 771 went on an "exclusion list," meaning vendors don't have to run these tests to win the coveted "Java-compatible" certification for their application servers.

Rollouts not hurt

While the problem has ruffled feathers, the vendors and industry experts say it should not hurt product rollouts.

"[The Java 2 Enterprise Edition specification] is a big animal," says Randy Heffner, an analyst with Giga Information Group. "It's a major standard that can be [interpreted] in different ways. It's normal that vendors will have trouble

"People claim they're J2EE-certified, but I'm going to [certify their products] through my own evaluation testing."

John Amos, director of financial systems, McKessonHBOC

implementing it."

But the glitches are frustrating for Sun, which released Java 2 Enterprise Edition (J2EE) with great fanfare one year ago. J2EE specifies behaviors, services and APIs as part of a programming model for Java applications on servers.

By all accounts Sun has responded quickly in making fixes to some tests, excluding others, and keeping the test process moving along. Sun engineers are putting the finishing touches on the next version of the J2EE specification, and this time Sun plans a beta test for the new code and the modified programs to test it.

ART Technology Group, BEA, Hitachi and iPlanet are shipping application servers certified as having passed the test suite. Iona, Silverstream and Sybase have announced their products have passed the tests but are not yet shipping.

Users wary

The test tempest is likely to make enterprise users wary.

"People claim they're J2EE-certified, but I'm going to [certify their products] through my own evaluation testing," says John Amos, director of financial systems at McKessonHBOC, a San Francisco drug distributor, and a BEA user. "There's a difference between marketing

See **Java**, page 14

Be a
Net Know-It-All
For the answer to this week's question and more net trivia, visit **Network World Fusion** and enter **2349** in the Search box.

This week's question:

Which Bell company did new AT&T President David Dorman once lead as CEO?

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FOUNDRY
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New firewalls catch up with gigabit-speed 'Net links

Cisco and NetScreen gigabit firewalls are first to feature high-speed VPN encryption technologies.

BY TIM GREENE

Two vendors are addressing a new problem companies face: How do you protect sites served by gigabit-speed Internet connections?

Cisco and NetScreen are the first to introduce gigabit firewalls that support high-speed VPN encryption needed to carry business transactions securely over public IP networks. Both companies' products support Triple-DES encryption at speeds slower than 1G bit/sec, but as a practical matter companies won't need to encrypt all traffic flowing over the Internet connections.

The need for high-speed firewall protection will grow as

more service providers emerge offering 1G bit/sec links to the Internet that corporations use for e-commerce or supporting VPNs that link enterprise sites, says John Lawler, an analyst with Infonetics Research.

One such provider, Yipes, says it is evaluating NetScreen's 1000ES firewall/VPN box to support a high-speed managed firewall service it is rolling out this week at subgigabit speeds, says Eric Zines, Yipes' director of product marketing.

NetScreen's enterprise offering, NetScreen-1000ES, supports a 1G bit/sec firewall that performs Triple-DES encryption at 600M bit/sec.

The encryption is faster than Cisco's new PIX 535 fire-

wall, which means enterprise customers can use the encryption more widely if needed.

"If the encryption results in a severe performance degradation, you might decide not to turn it on, which is not a good idea from a security point of view.

Usually, you want all the pieces to work at the line rate," Lawler says. The NetScreen-1000ES also has a failover option.

NetScreen-1000ES also supports five separate virtual LAN segments, and customers can define different levels of security for each segment.

The NetScreen-1000ES is available now for a base price of \$65,000.

Cisco's PIX 535 firewall appliance (see review, www.nwfusion.com, DocFinder: 2158) sports a 1G bit/sec firewall and supports 100M bit/sec Triple-DES encryption via a VPN accelerator card (VAC).

The nine-slot PIX 535 chassis supports one- or four-port 100M bit/sec Ethernet cards to connect with LAN devices, a Gigabit Ethernet uplink card and a VAC that performs encryption with its own processors.

The device includes intrusion-detection capabilities for about 50 standard attacks and can be configured to block them and trigger alarms if those attacks are under way.

Cisco sells a base model of

the PIX 535 as well as an enhanced model that increases RAM from 12M bytes to 1G byte and includes software that enables the box to fail over to a standby PIX 535.

The PIX 535 is available this month at a base price of \$60,000, and a price of \$75,000 for increased RAM and failover capability. Cisco VACs cost \$7,500.

NetScreen: www.netscreen.com; Cisco: www.cisco.com

VPNs

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DocFinder: 5434



Negen gear could spell inexpensive services for branch offices

BY TIM GREENE

MARLBOROUGH, MASS. — Start-up Negen Access says it has a new way for service providers to support inexpensive Internet access, phone and data service packages that are suitable for corporate branch offices and small businesses.

Using a single phone line and very-high data rate DSL (VDSL) technology, Negen equipment can support two phones, eight 10/100M bit/sec Ethernet connections and Internet access in a single, customer-site device in a remote office. Negen's version of VDSL supports bidirectional speeds of 10M bit/sec on regular phone wires.

This configuration would eliminate separate phone lines and data lines as well as a WAN router. While the savings passed on to customers will be up to individual service providers, carriers could provision services for as little as half the cost of traditional technologies, the company says.

Negen makes two boxes: one for customer sites called Convergence Branch Gateway and one for service provider points of presence called Broadband Access Switch, which aggregates traffic gathered from customer sites.

The access switch forwards the traffic to service provider switching offices via Gigabit

Ethernet uplinks.

The gateways feature analog phone ports and 10/100 Ethernet ports. The boxes are stackable and come in different configurations to support greater or fewer phone ports.

Other vendors, such as Alcatel, Cisco and Nortel Networks, make customer-site gear that integrates customer traffic onto a single access line. But they don't support VDSL and don't include a PBX as part of the box, as does Negen.

However, the company faces competition from another start-up, Kenetec, which has announced a similar family of devices that will be available next year, says Jack DaQuano, an analyst with the Hurwitz Group.

In addition to VDSL, Negen plans to support fiber, satellite and other WAN technologies using a modular WAN port. Negen plans to demonstrate this equipment at the ComNet 2001 show in Washington, D.C., in January, and will ship later next year.

A down side

On the negative side, customers will face the possibility of losing all branch communication if the gateway fails,

DaQuano notes, so Negen will have to demonstrate that the box is highly reliable. The customer site gateway can be con-

figured to support a separate regular phone line that would still work even if the box failed.

Negen: www.negen.com



BREATHING NEW LIFE INTO COPPER LINES

Telco Systems, the venerable maker of service-provider equipment, plans to introduce gear that can turn copper phone lines in an enterprise campus into 10M bit/sec voice/data links.

Telco Systems' CopperMax switch, which the company will show next month at ComNet 2001 in Washington, D.C., uses the fastest flavor of DSL — very-high data rate DSL — to make high-bandwidth links possible across short distances.

Carriers typically use slower DSL flavors that can travel over longer wires and, therefore, reach more customers. But on campuses and within buildings, VDSL can support LAN speeds at up to three-quarters of a mile.

In addition to campus applications, Telco Systems also envisions using the equipment to support voice and data traffic within buildings, such as hotels. CopperMax would sit in the basement of the hotel and take in lines from guest rooms. A separate filter would split off the voice traffic and divert it to the hotel's PBX. CopperMax does not offer a PBX.

The device will be available next year. Pricing is not set. TelecoSystems: www.telco.com.

— Tim Greene

PROFILE: NEGEN ACCESS

Location:	Marlborough, Mass.
Founded:	August 1998
Primary products:	Convergence Branch Gateway and Broadband Access Switch, equipment to support voice/data over VDSL.
Financing:	\$2.6 million from angel investors and Corning Technology Ventures
Employees:	30
Competitors:	3Com, Alcatel, Cisco, Nortel Networks



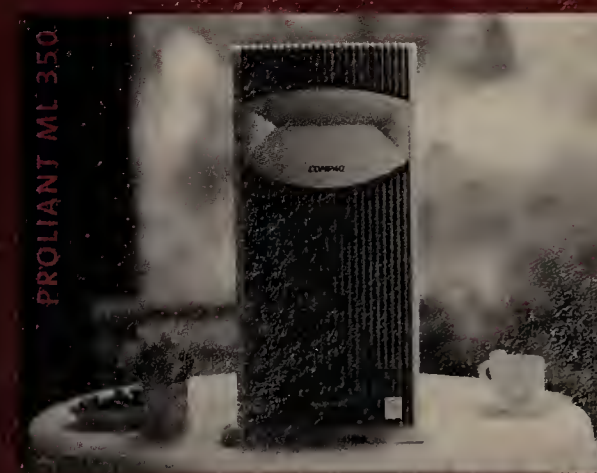
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Tivoli to sell service desk suite to Peregrine

BY DENISE DUBIE

AUSTIN, TEXAS — Tivoli Systems will soon sell its line of service desk products to Peregrine Systems, *Network World* has learned.

Neither company would comment on the impending sale, but according to an internal Tivoli document obtained by *Network World* last week, "Tivoli Service Desk Suite will become a

Peregrine product, and Peregrine will provide product support for all customers of Tivoli Service Desk."

Peregrine will also take over sales and maintenance contracts for the Service Desk

Suite products. Although no specific takeover date was indicated, the document says the transition for Tivoli customers to Peregrine is scheduled for this month.

The products affected by the

flow management and configuration, and fault management automation functions.

Tivoli introduced the Service Desk Suite in May 1998 following its acquisition of Software Artistry.

Peregrine provides infrastructure management products including ServiceCenter. The firm's service management workflow software includes service, problem,

inventory and change management components. According to the Tivoli Web site, ServiceCenter can work with Tivoli Enterprise products.

Industry analysts speculate that Tivoli might be selling this

product line to focus more on the wireless and mobile market and shed an installed base that may no longer be a significant source of revenue.

Peregrine might be expanding its reach in that market and purchasing the line to gain access to the installed base of Tivoli Service Desk customers.

But considering Peregrine's product suite, Tivoli's offerings may eventually fade away, as they are similar to Peregrine products, observers say. The key difference between the two products is that Tivoli's help-desk offering is an add-on to its network management framework product and Pere-

grine's is stand-alone software.

"Even though they both have solutions for enterprise level help desks, I wouldn't say they overlap," says Fred Broussard, an analyst with IDC. "When you speak to the vendors, they don't seem to quote each other as direct competitors in sales deals."

Tivoli: www.tivoli.com; Peregrine: www.peregrine.com

■ **"Tivoli Service Desk Suite will become a Peregrine product, and Peregrine will provide product support for all customers of Tivoli Service Desk."**

Internal Tivoli memo

sale, according to the document, include Tivoli Problem Management, Tivoli Asset Management and Tivoli Change Management. The products provide base system and network management, help desk work-

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Praxon adds voice recognition

BY PHIL HOCHMUTH

LAS VEGAS — Praxon last week announced it would bundle voice recognition cards from iVoice in its Phone Data Exchange line of converged phone servers.

The company demonstrated voice recognition on Phone Data Exchange (PDX) with the iVoice card at the Communications Solutions Expo in Las Vegas.

PDX users will be able to set up voice-enabled directories, allowing callers to say the name of the person they are trying to reach instead of dialing an extension. The iVoice card and software could also let users set up voice-enabled customer service systems.

Voice recognition was previously available predominantly in proprietary PBX systems designed for large companies, says Joyce Tam, marketing director for Praxon. The Windows NT-based PDX, combined with the iVoice card, makes voice recognition accessible to smaller companies and branch offices, she adds.

Ellipsis Graphix, a Los Gatos, Calif., print brokering firm, uses the Praxon PDX in its 20-person office. Frank Shuman, Ellipsis' president, says he is interested in adding voice recognition to his system.

"The PDX system lets me do a lot of things for my office," such as calling customers directly from a contact database on a PC, Shuman says. "[Voice recognition] would make it that much easier for customers to contact us."

PDX performs the functions of a PBX or key phone system, including voice mail, auto attendant, call transferring and forwarding. The PDX also acts as a unified e-mail/voice mail server that lets users call contacts from applications such as Microsoft Outlook. Users can also set up phone system preferences from a PC.

"End users demand enhanced functionality when they buy a phone system" that converges voice and data, says Joe Gagan, a senior analyst with The Yankee Group. There are cost savings in buying server-based PBXs — which can cost 40% less per seat than proprietary PBXs — but it's applications such as voice recognition that will drive the market for converged PBXs, he adds.

The PDX with an iVoice card starts at \$200 per seat. ■

Convergence

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Content delivery nets aim to sync up

BY APRIL JACOBS

SAN DIEGO — Members of the content delivery network community this week will assemble at the 49th Internet Engineering Task Force meeting in San Diego to find a better way to work together — an effort that could benefit vendors and their customers.

Participants in a birds-of-a-feather discussion will try to establish a formal IETF working group focused on advancing standards that will enable competing content delivery networks to exchange traffic and ensure that equipment and software used to support such networks are interoperable.

Integration among content delivery networks could be a boon for companies using those networks to distribute their content. Like telephone companies and ISPs involved in peering arrangements, content delivery network partners could work behind the scenes to swap traffic and settle billing issues. By working together, they could expand their reach relatively inexpensively and enable customers to deliver content in a more timely fash-

Coming together on content

It remains unclear whether two existing groups, Content Bridge and Content Alliance, will join forces or how they will contribute to this week's content delivery discussion at the IETF meeting.

Content Bridge

Mission:

To improve the performance and end-to-end quality of service of the Web through a cooperative content distribution model.

Key members: Adero, Alteon WebSystems, Exodus, Inktomi, Intel.

Content Alliance

Mission:

To foster interoperability of content delivery networks.

Key members: Cidera, Cisco, EMC, StorageNetworks.

Note: Some companies belong to both groups.

ion by staging it closer to information consumers.

It's unclear yet who will contribute to the discussion, or what the impact of such a working group would be on two existing content delivery network forums: Content Bridge (which includes AOL and Inktomi); and Content Alliance (which includes Cisco and Cable & Wireless). Members from both groups are expected to participate in the IETF meeting, and Mark Day, chief scientist at Cisco, will chair the meeting.

Glenn Kaino, a vice president at music entertainment compa-

ny Farmclub.com, would like to see content delivery networks work together more closely.

"Networks are trying to compete with each other, but for us, the content provider, it would help to have some standard mechanisms where quality is ensured," he says. "We do a lot of trial and error with different vendors."

Content Distribution Inter-networking Birds-of-a-Feather group: www.ietf.org/ietf/00dec/cdn-agenda.txt; Content Bridge: www.contentbridge.org; Content Alliance: www.contentalliance.org

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DSL providers' bloodbath continues

More CLECs slash headcounts and scale back their network rollout plans.

BY MICHAEL MARTIN

A trio of competitive DSL providers last week announced plans to scale back their operations, the latest setbacks for a market that increasingly looks as though it will be dominated by the Bell companies.

The bad news for competitive DSL firms included:

- HarvardNet, which operates in the Northeast and Mid-Atlantic regions, revealed that it will cut about 280 employees — more than half of its staff — and exit the DSL business. The company now plans to concentrate on Web hosting and managed services.
- NorthPoint, which had its intended merger with Verizon scrapped by the incumbent local exchange carrier two weeks ago, announced it would lay off 248 workers — about 19% of its workforce.
- Two weeks ago Covad Communications announced

that it was cutting 400 positions and halting its network expansion at 2,000 central offices.

• Zyan, a Los Angeles firm, filed for Chapter 11 bankruptcy protection and is laying off about 160 of its 230 employees.

sive at a time when funding is drying up, and DSL stocks are getting hammered on Wall Street.

"It's a very difficult environment to operate in right now," he says.

The three biggest competi-

back of operations.

HarvardNet is working to transition its several thousand customers to other DSL providers, Washburn says. The company was still working on the transition plan's details at press time.

Despite the problems in the DSL market, Adam Guglielmo, an analyst with telecom research firm TeleChoice, says providers that execute properly can succeed.

"Too many companies came into the market with the same idea," he says. "They were worried about starting a buildout quickly and worrying about profit long-term."

One key to success is building effective customer service and provisioning and billing infrastructures, which many of the DSL providers didn't do, Guglielmo explains.

Another key may be offering value-added services to make up for the falling DSL transport prices, he says. ■

■ "It's a very difficult environment to operate in right now."

Mark Washburn, CEO, HarvardNet

These announcements came a week after DSL.net announced it was laying off 141 employees, about 28% of its workforce, and reining in its network expansion.

A difficult environment

Mark Washburn, HarvardNet's CEO, says building out DSL networks and maintaining ongoing DSL operations is proving to be too capital inten-

sive DSL providers — NorthPoint, Covad and Rhythms — have seen their stock prices fall precipitously over the course of 2000. As of 3 p.m. last Thursday, not one of their stocks was worth more than \$2.

Washburn notes that Rhythms, which has the most cash on hand of any DSL provider, is about the only major provider not to announce job cuts or a scaling

each licensee.

The second is a group of 5,824 tests, called the compatibility test suite, which a vendor uses to check that its product will correctly store an Enterprise JavaBean, make a call to a database through the Java Database Connectivity interface, and so on.

A 'fiasco' for some

But as vendors began testing their products, they found not only problems with their

own code, as intended, but also bugs in the reference implementation and the tests.

"It's a fiasco," says Robert Bickel, executive vice president for Bluestone Software, a Philadelphia application server vendor.

"We wasted three weeks on just a couple of issues," Bickel says.

According to Sun, one issue had to do with transactions that involve two or more databases, a feature that is an optional part of the current J2EE Version 1.2 specification. Initially, there were no software drivers available for these distributed transactions, says Karen Tegan, Sun's software engineering manager for J2EE. Bluestone added distributed transactions to its product and then found that Sun's tests could not verify key parts of this type of transaction.

"Now there are drivers available, and we're working on a patch for these tests," Tegan says.

In general, Tegan says, if flawed tests are found that have a major impact on appli-

cation portability or affected vital areas, engineers scramble to write and release repairs, often in a just a few days. Otherwise, flawed tests are put on the exclusion list. All J2EE licensees can ignore tests on this list.

Minor problems

Other vendors reported minor and manageable problems, and praised Sun's responsiveness.

"I think anyone who expects that any company can produce this amount of code [in the reference implementation and test suite] that's bug free, is dreaming," says Loren Corbridge, a product manager at Sybase.

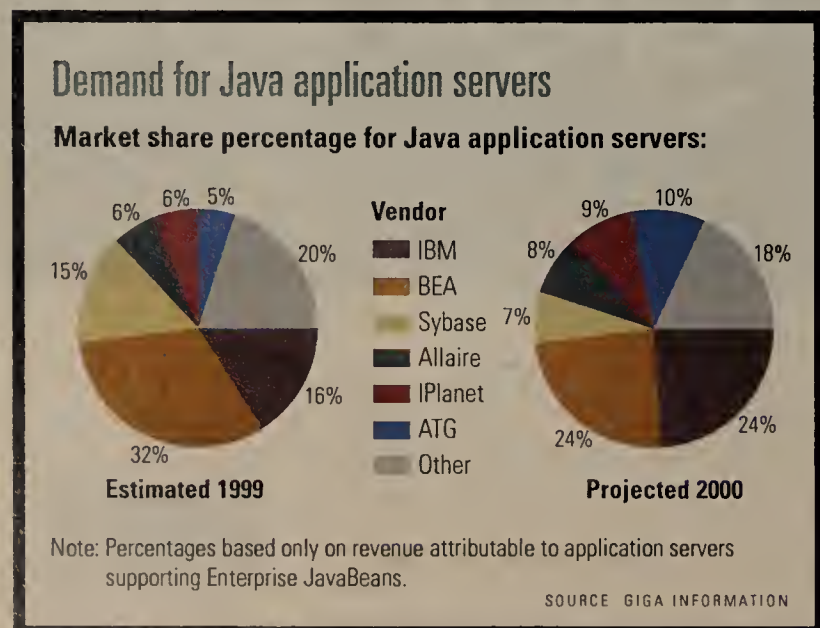
"We did find some flaws in the tests. We reported them, and most of them were patched," Corbridge says. ■

Java,
continued from page 8

and reality, and it's a question of where the two shall meet."

To ensure that a Java component will run the same on any application server, Sun engineers wrote two sets of Java code.

One is their own version of the J2EE APIs and services — called the reference implementation — for which the source code is available to



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ASPs can help a start-up quickly gain altitude

Intraware turned to USinternetworking to get customer resource management applications up and running.

BY DENISE PAPPALARDO

Getting a young company off the ground quickly can be a formidable task, which is why Intraware turned to an application service provider for help launching its sales force.

Intraware's trials and tribulations of keeping its sales team on one centralized system is the subject of this final installment of a three-part series looking at the experiences of ASP customers.

Intraware was founded in 1996 and went public last year. After deciding to use Siebel customer relationship management (CRM) software

trust and ownership issues that we had to overcome."

Before the shopping process started, an internal committee was set up that consisted of representatives from various departments. The group hashed out what was needed and expected of an ASP partner.

Intraware wanted to outsource Siebel and PeopleSoft enterprise resource planning applications to one ASP when it first started shopping around

about 15 months ago. But at the time the market was immature and Intraware had to team with two ASPs. Another team focused on getting PeopleSoft online while Fenn and his



Intraware's Shaun Fenn outsources the company's customer relationship management application with an ASP.

access server that uses digital certificates and encryption so employees can access the application server while traveling.

online, Intraware was changing its sales team structure, which directly affected software configurations. "For instance, one month the sales folks may have been vertically assigned and then they were territory assigned," he says.

"It was difficult keeping USi on the same page... Our lack of structure really hurt our Siebel implementation," Fenn adds.

Intraware also needed to sign on experts to customize its Siebel software. "ASPs like to stamp out configurations, at least that's been our experience," Fenn says. "And of course, those configurations don't work for every business model."

Intraware used Siebel consulting services to tweak the CRM application to Intraware's needs.

Need solid SLA

One of the company's biggest concerns had to do with setting

up solid service-level agreements (SLA). Intraware has a 99% application availability guarantee. "But connectivity, not availability, is our biggest issue," Fenn says. "So the ASP's guarantee is a wonderful thing within the data center, but doesn't apply to factors outside the data center."

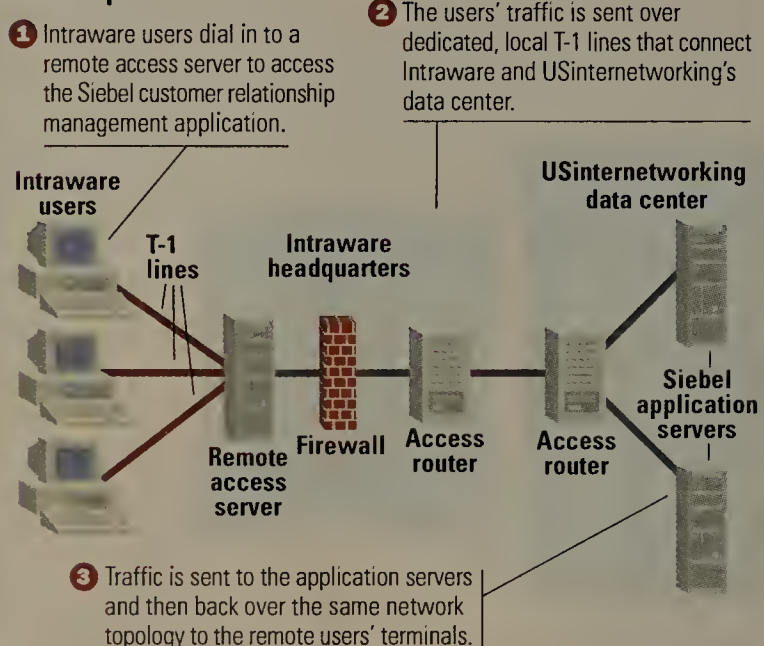
"I strongly recommend getting an SLA that's more related to connectivity or your business model," he says. "The ASP needs to feel the pain when you do."

Intraware is an early ASP customer and has gone through a lot of learning with USi, Fenn says. While not seeing huge cost savings, the company expects to save some money down the road. "That's one of the reasons why we signed up with an ASP," he says.

"We have learned the hard way that sales force automation is an environment, not just a project that you walk away from once it's installed," he says. "If I knew some of the things I know now back when we started, we'd be in much better shape." ■

Remote access to Siebel

More than 150 remote users access Intraware's Siebel application that's hosted at USinternetworking, the company's ASP. Here's the setup:



as its sales force automation platform, the company soon realized its internal IT resources were too strapped. Outsourcing the application seemed like the best option in to allow existing IT staff to work with Intraware customers, says Shaun Fenn, director of sales IS.

"This was the first application we outsourced," he says. "We have a lot of applications that were built in-house and senior management had some

group concentrated on Siebel.

After looking at five or six application hosting and outsourcing companies, Intraware chose USinternetworking (USi). "They were clearly the best fit for us," he says.

USi set up multiple servers supporting the company's CRM application in its data center in Milpitas, Calif., near Intraware's headquarters. Intraware connects to the data center via a local dedicated T-1. Intraware has set up a dial-up remote

Fenn says he and his team are partly to blame.

"Something we didn't have going in was a clear data model, which I highly recommend," he says.

Notifying the ASP as to how the majority of employees will access the applications from an established location or from the road is important to spell out in the beginning, he says. Next year, Intraware may switch to an Internet-based VPN system after Siebel rolls out its Web-enabled client, but it's difficult to plan for that when the software is not available, he says.

Ensuring that the lines of communication stayed clear was also a challenge.

"Because we're a start-up, we're constantly moving very quickly, yet struggling to keep USi up to speed with our changes," Fenn says. "We had weekly conference calls with USi to update us on every issue and also to update them on our changes."

As Siebel was coming

Emulex buys Giganet

BY DENI CONNOR

COSTA MESA, CALIF. — Emulex last week announced plans to acquire Giganet in a \$645 million stock deal that will enable Emulex to offer a mix of Fibre Channel- and Ethernet-based products for storage networks.

"The acquisition of Giganet extends Emulex's leadership position in storage networking host bus adapters from Fibre Channel into the IP arena," Emulex CEO Paul Folino says.

Emulex, which sells Fibre Channel host bus adapters used to build storage-area networks, will create an IP network group built around Giganet's offerings.

Giganet's Virtual Interface products are used to build low-cost server farms, and

include host adapters and cluster switches that enable server-to-server network clusters.

The Concord, Mass., company, which has 100 employees and generates about \$500,000 per year in revenue, sells products that run on Windows NT and Linux systems.

Emulex has been on a roll. The company's revenue for fiscal year 2000, which ended July 2, doubled from the previous year to roughly \$140 million. The company made nearly \$33 million in profit. ■

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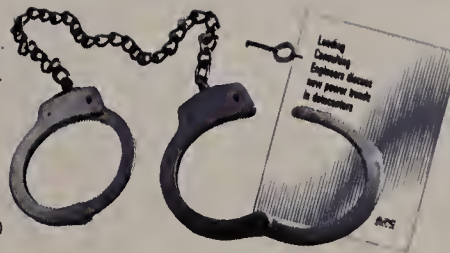
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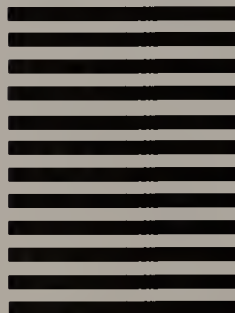
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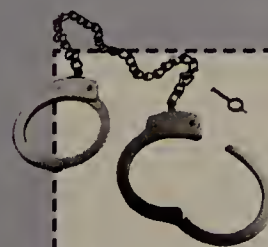
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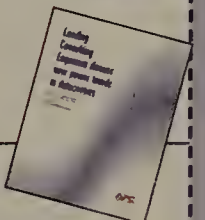
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Tricord to roll out scalable storage appliance

BY DENI CONNOR

MINNEAPOLIS — Tricord Systems this week will introduce a network-

attached storage appliance for customers looking not only for ease of use, but also scalability — a combination not typically found in such devices.

Tricord, which emerged in 1987 as a maker of superservers, shifted its strategic direction in 1996 to focus on the appliance market. The company, taking

advantage of its knowledge of file I/O systems, has been hunkered down for the past few years developing its appliances, the first called Lunar Flare. The company plans to follow up with Web, e-mail, database and content delivery devices.

Lunar Flare, a NAS appliance for Windows NT/2000 networks, is rack-mountable, 1 3/4-inch high and boasts 135G bytes of storage capacity. Lunar Flare supports Microsoft's Common Internet File System; future appliance releases will support Unix's Network File System.

The boxes also include software, dubbed Illumina, that aggregates up to

■ **"Tricord's technology would have been an oxymoron before this — a scalable appliance."**

Robert Gray, analyst, IDC

16 of the boxes into a cluster with a common storage pool. The ability to scale the appliances through clustering will differentiate Tricord's offering from those of competitors such as Network Appliance.

"Tricord's technology would have been an oxymoron before this — a scalable appliance," says Robert Gray, an analyst with market research firm IDC.

Tricord says end users can access storage on any node in a cluster, and companies can add nodes to clusters without interrupting service. When a node fails, others can take over its workload.

"We've played with NAS from other vendors, but Tricord's aggregation software is pretty sweet — it makes storage look like a single storage pool that can be mirrored and striped," says Rick Bauer, chief information officer at The Hill School, a private school in Pottstown, Penn.

"Last week our students installed the Tricord NAS device in less than a class period," Bauer says. "We have digital editing equipment, and we're chewing up a fair amount of storage. NAS doesn't require the fundamental religious and financial conversion a [storage-area network] infrastructure does, and it gives the ability to add storage without adding servers."

Tricord's Lunar Flare and Illumina software will be available in the first quarter of 2001, starting at \$5,000 per node.

Tricord: www.tricord.com



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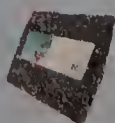
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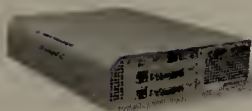


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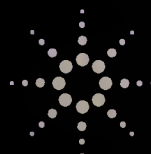
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Metro Ethernet provider makes debut

BY MICHAEL MARTIN

NEWARK, N.J. — FiberCity Networks last week became the latest provider to enter the increasingly crowded metropolitan Ethernet services market, offering high-bandwidth services for businesses in multitenant buildings.

The company will try to set itself apart by offering more than just Internet access, which the company will deliver at 100M bit/sec. FiberCity's offerings also include private LAN interconnection, storage-area network services, server hosting, thin-client applications, and streaming and multicast IP video. FiberCity also offers SONET services.

FiberCity's offerings will compete with traditional high-speed carrier services such as T-1 and T-3 access, as well as against other metropolitan Ethernet offerings.

Multitenant properties are becoming a popular market for metropolitan Ethernet providers. Service provider Cogent Communications offers high-speed 'Net services to buildings in major markets, and IntelliSpace offers a range of multitenant building services, including high-speed Internet and VPN offerings.

Everest Broadband also recently announced an agreement with Metro-media Fiber Network that will let Everest begin offering metropolitan Ethernet services.

Aside from offering a variety of services, FiberCity is different from competitors in that its network operates at Layer 2, rather than Layer 3, says Daniel Flohr, FiberCity's CEO. He says that by operating at Layer 2, FiberCity can reduce its equipment costs and offer customers better security than Layer 3 equipment provides.

Currently, FiberCity is serving about 4.5 million square feet of commercial space. Within the next year, the firm plans to serve almost 200 buildings, covering about 100 million square feet, in major cities throughout North America.

"What we're doing is taking LAN thinking and applying it out to metropolitan LANs and national LANs," Flohr says.

FiberCity connects buildings to its network through fiber that it leases on long-term contracts from Metromedia Fiber Network. Each building is served by links providing about 4.8G bit/sec of connectivity. Within buildings, customers should get between 1G and 2G bit/sec. Flohr says the company's goal is to serve each desktop with at least 2M bit/sec of bandwidth.

The FiberCity network relies on Cisco equipment. FiberCity runs four Gigabit Ethernet lines and OC-12 for SONET services to each building on its network. The lines terminate at a Cisco switch in the building basement. Tenants of the building are then connected to the net-

work by a Gigabit Ethernet local loop that terminates at a customer premises Cisco switch.

Because FiberCity uses spanning

tree to detect the loss of a signal loss if a line goes down and reroutes traffic to a live line, Flohr thinks the company can provide near-carrier class service.

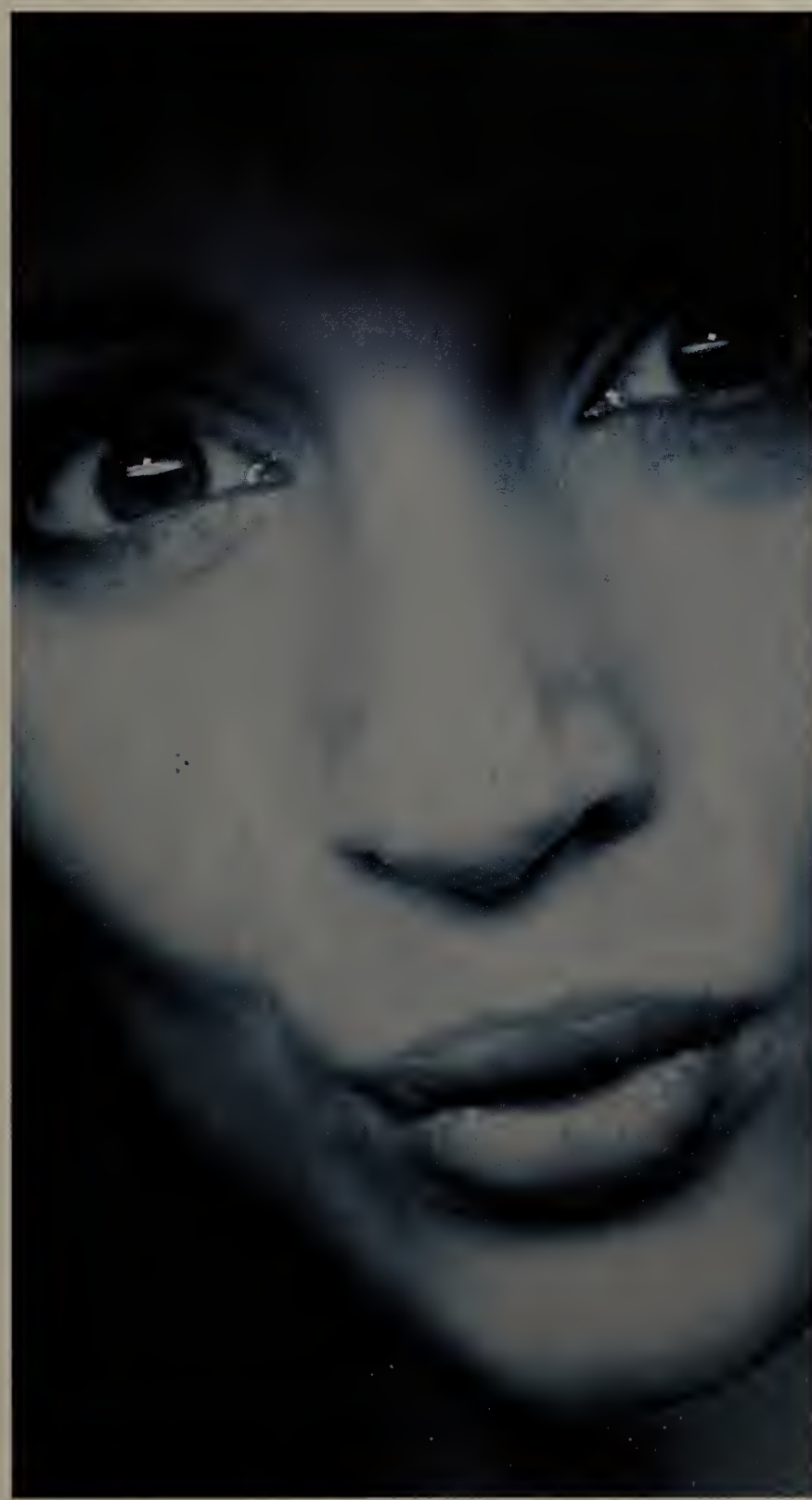
For companies requiring LAN connectivity between cities, FiberCity negotiates with third-party, long-haul providers for private bandwidth.

FiberCity's services begin at \$795 per month for 100M bit/sec Internet access.

FiberCity: www.fiber-city.com

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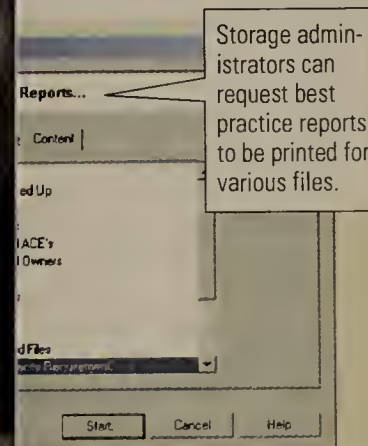
Services

day server.

ay server support] with the announcement, but all of this is also available in other," says John Dunkle, an analyst Workgroup Strategic Services. ys Dell is under pressure on w end — its traditional strong- n IBM, which also has a line of rvers. On the high end, Dell te with HP, IBM and Compaq. s high hopes for the new Michael Lambert, senior vice of Dell's Enterprise Systems vs Dell's announcement of services and server hardware part of an overall strategy the opes will allow it to overtake the leading server vendor.

ew servers include the Pow- 0 and PowerEdge 350, which eral-purpose, rack-mounted See **Dell**, page 26

Resources



erver, which has all the afore- l features.

axx SRM can also monitor and ernet temporary files, empty le bin and erase temporary s on desktops.

erver version costs \$150 per Professional edition costs \$29 ation.

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and HP-CP servers via McData switches. The software also generates 28 best-

sions. Professional, which does not allow custom, scheduled or on-the-fly report-

Enterasys switch boosts security, eases installation

The stackable Vertical Horizon 4802 features high Layer 3 port density and intrusion detection support.

BY PHIL HOCHMUTH

ROCHESTER, N.H. — Enterasys Networks last week introduced a new 48-port switch that promises to bring easier management and improved security to enterprise wiring closets. The new switch also kicks off Enterasys' Vertical Horizon product line — a rebrand of the Cabletron SmartStack switch line.

The Vertical Horizon 4802 should appeal to network managers looking to aggregate 30 to 48 PC connections in a single device instead of through a stack of two 24-port switches. This can save rack space and provide for easier manage-

ment, according to Enterasys.

The switch also includes several security features for defending LANs against internal and external hacking attempts. Enterasys says the new switch will compete with Cisco's Catalyst 3548XL and the Summit 48 from Extreme Networks.

The switch's high port density allows network professionals to aggregate a large block of user connections into one device, and to manage those connections from a single device, according to Julian Gilbert, marketing manager for the Vertical Horizon product line.

Don't call it a SmartStack

Enterasys Networks has renamed its SmartStack line of stackable workgroup switches to Vertical Horizon. The first product under the new name, the VH-4802, features:

- 48 10/100M bit/sec Layer 3 Ethernet ports with two Gigabit uplink slots.
- Device-level password authentication.
- A Web-based security and management tool.

The 48-port VH-4802 offers the most ports in a stackable switch that Enterasys has offered, Gilbert says. Previous SmartStack products maxed

out at 24 ports per device, he adds.

The VH-4802 has 48 10/100M bit/sec Layer 3 Ethernet ports for connecting workstations and other end-user devices. All ports can autosense connection speed. The switch supports the 802.1Q virtual LAN and 802.1p traffic prioritization standards for virtually segmenting groups of users and setting the quality of service those groups receive.

The VH-4802 also has two slots for long-haul 1000Base-LX or shorter-range 1000Base-SX fiber-based, single-port Gigabit Ethernet modules for connect-

ing to a network backbone. Also available is a two-port 100Base-FX Fast Ethernet module. A copper-based 1000Base-T Gigabit module is expected to be released in January. The VH-4802 also supports trunking with its expansion slots — for up to 4G bit/sec of uplink speed — when Gigabit modules are used in full-duplex mode.

The VH-4802 provides network security with several authentication features, such as device-level password authentication and media access control address port locking, which allows PCs to be tied to a designated switch port via their MAC address.

The switch also features software hooks that tie the switch into Enterasys' intrusion detection software, which was acquired from Network Security Wizards in October. This allows it to be monitored for intrusion detection from inside and outside the network.

The switch also supports remote monitoring and SNMP management, as well as port mirroring for connecting a network analyzing tool to the device.

By 2004, Layer 3 switches will account for half of all revenue in the worldwide LAN switching market, according to market research firm IDC. The firm also predicts that the installed base for Layer 3 switches will increase more than 11 times between 2000 and 2004.

The VH-4802 is available now and costs \$4,000.

Enterasys Networks: www.enterasys.com

Dell,
continued from page 25

servers. The PowerEdge 1550 features dual Pentium III processors (up to 1 GHz), dual 64-bit/66-MHz PCI buses, up to 4G bytes of RAM, and up to three hot-pluggable, SCSI hard drives.

The PowerEdge 350 features a single Celeron or Pentium III processor, up to two Integrated Drive Electronics (IDE) hard disk drives, up to 1G byte of error correcting and checking synchronized dynamic random access memory, and dual, integrated Intel Pro 10/100+ network interface cards. These servers can be used in branch offices or data centers. On a smaller scale, the company rolled out the PowerApp.web I20 and PowerApp.web I10 turnkey Web server appliances, which can be set up to run either Windows Powered IIS 5.0 or Linux Apache I.3.I2.

The PowerApp.web appliances are aimed at users with Web and e-commerce sites that need to quickly add servers. For example, the PowerApp.web I20 server comes preconfigured with either the Windows or Linux Web server software stacks. Both PowerApp.web servers feature Web-based user interfaces that let users do remote or local administration via a browser. Administrators can also use

Dell's PowerApp Kick-Start software, which automatically detects PowerApp.web servers on the network and configures them remotely.

Dell also expanded its technical consulting and mission-critical support services. The company's new consulting services include:

- Infrastructure Assessment, Architectural Validation and Implementation Services for customers prepared to move

■ **"Dell could capture some low-hanging fruit with the Unisys announcement, but all of this stuff is available in other places."**

John Dunkle, analyst, Workgroup Strategic Services

to a Windows 2000-based e-commerce environment.

- Rapid Design & Deployment Services, a packaged e-commerce service based on Dell and Microsoft technologies for users that need to quickly increase capacity.

- Performance Tuning and Stress Testing Services for infrastructure.

- Enterprise Expertise Center, which has a single point of contact for engineer-to-engineer technical support, customized support plans, root-cause analysis for issue resolution, proactive health check services, responses to change requests and report-

ing. Users get reports that summarize uptime statistics, issue resolution and recommendations for enhancing systems availability.

- Remote Monitoring, which offers rules-based systems monitoring options, ranging from basic prefailure alerting to comprehensive server, operating system and storage monitoring with trend and fault analysis. Systems can be monitored by Dell's Enterprise Expertise Cen-

ter, or by the user's own help desk.

- Comprehensive on-site hardware support, ranging from two-hour response and six-hour hardware repair to customized on-site spare kits and on-site system engineers.

- Customized Systems Availability Guarantee Programs, which provide maintenance services to meet each customer's uptime requirements.

- PowerVault Advanced Software and Configuration Support for Dell's storage support offerings, including guaranteed response times.

- Dell OpenManage Sub-

scription Service, which provides quarterly updates of systems management software, updated documentation and the most recent BIOS, drivers and utilities. Dell also announced the sixth version of its OpenManage software. OpenManage software tools can be used to help install and configure Dell PowerEdge and PowerApp servers and PowerVault storage systems.

Dell updated two components of its systems management suite, Dell OpenManage Server Assistant and Dell OpenManage IT Assistant. New features help install the server operating system, configure drivers and RAID and storage arrays at the time of system setup. Dell also says next year it plans to simplify management of its systems by consolidating existing management tools into one Web-based console.

The PowerEdge 1550 is scheduled to be available in January at a starting price of \$2,599. The PowerEdge 350 is slated to be available in February with a starting price of \$1,499. The PowerApp.web 110 and PowerApp.web 120, also expected to be available in January, will be priced at \$1,499 and \$2,599, respectively. The newest versions of Dell OpenManage IT and Server Assistant ship with all new Dell servers.

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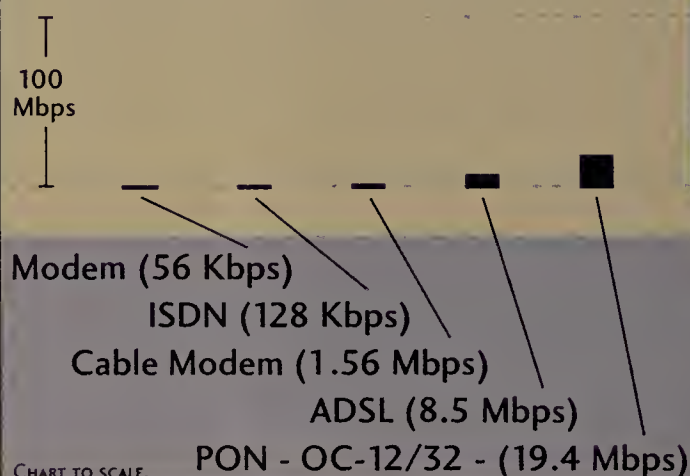
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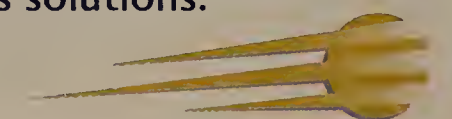
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Infrastructure

IP telephony in a neat package

Alcatel's starter kit to ease enterprise VoIP implementation.

BY PHIL HOCHMUTH

CALABASAS, CALIF. — Alcatel has released an IP voice product bundle intended to help midsize businesses and enterprise branch office users ease into packetized telephony.

The IP Telephony Starter Kit gives network managers all the puzzle pieces for putting together the basics of converged voice/data networks while leaving room for expansion, according to Alcatel.

The kit includes an Alcatel OmniPCX 4400 IP PBX, an OmniStack 6024 stackable workgroup Ethernet switch and 10 Alcatel IP Reflex phones. The OmniPCX 4400 supports analog, digital and IP phone connec-

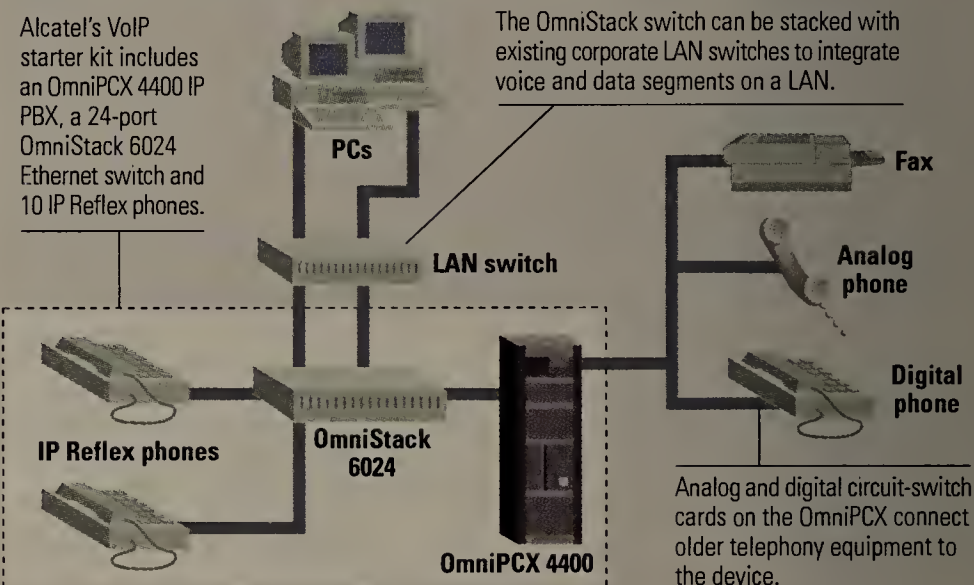
Chassis can be tied together to support up to 5,000 extensions, he adds. The kit also comes with one day of on-site installation from Alcatel and one year of maintenance.

"This [kit] lets customers see the end result [of a voice-over-IP system] right away instead of having to put the parts together themselves," says Chris Kozup, a research analyst with the Meta Group.

Kozup believes that many users would like an end-to-end, voice-over-IP infrastructure to come from one vendor — from the phones and the call server to the switching equipment. This differs from the trend of installing network equipment from multiple vendors in corporations, he

Easing into VoIP

Alcatel is offering a voice-over-IP starter kit that includes a PBX, LAN switch and phones. The company says it will give midsize companies a manageable package for rolling out voice over IP in an office or branch office.



tions, which can help integrate older fax machines and conference call stations in an office. It also supports standard PBX functions such as voice mail, text messaging, directory calling and conference calling.

"This package provides everything you need to get started with IP telephony," says Pascal LeGuen, marketing director for Alcatel. He says the package could be used as a starting point for replacing a phone system in a midsize business or branch office, or it could be integrated into a company's central office phone system.

"This platform can be networked with the rest of the legacy phone system," LeGuen says. This is done by connecting the OmniPCX 4400 to a traditional PBX via a T-1 line interface. "If customers want to add more lines to the system, they can add some boards, and a single chassis will scale up to 250 phones."

adds, and more closely mirrors how traditional PBX systems have been installed.

"A kit like this allows for a seamless management approach from a user perspective," Kozup says. "I definitely expect to see tighter integration of products from vendors" that offer IP voice and data equipment. Such companies include Cisco, Nortel Networks, Avaya and 3Com for smaller businesses, he notes.

The IP Telephony Starter Kit costs \$20,000 and is available now until March 31, 2001.

Alcatel: www.alcatel.com

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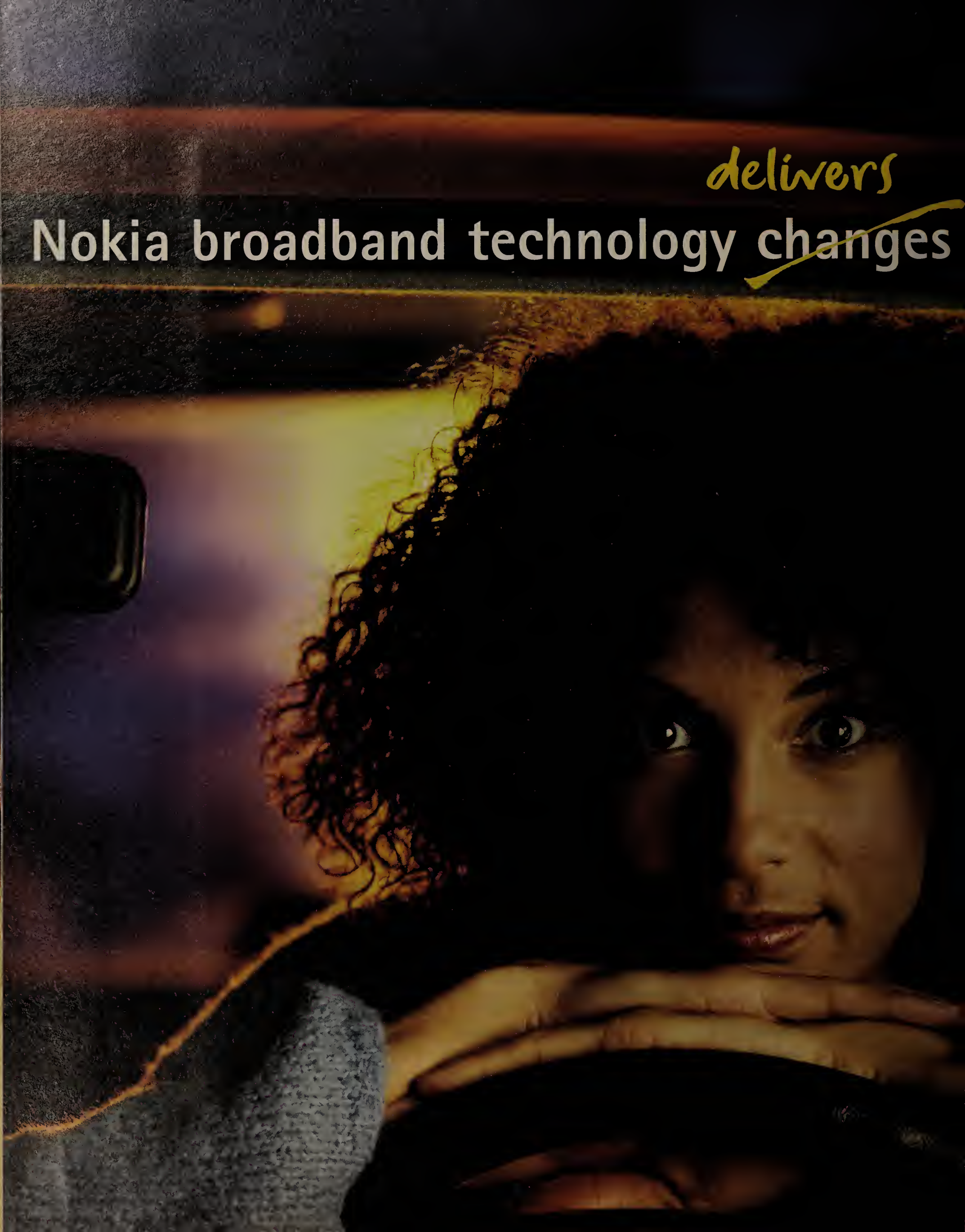
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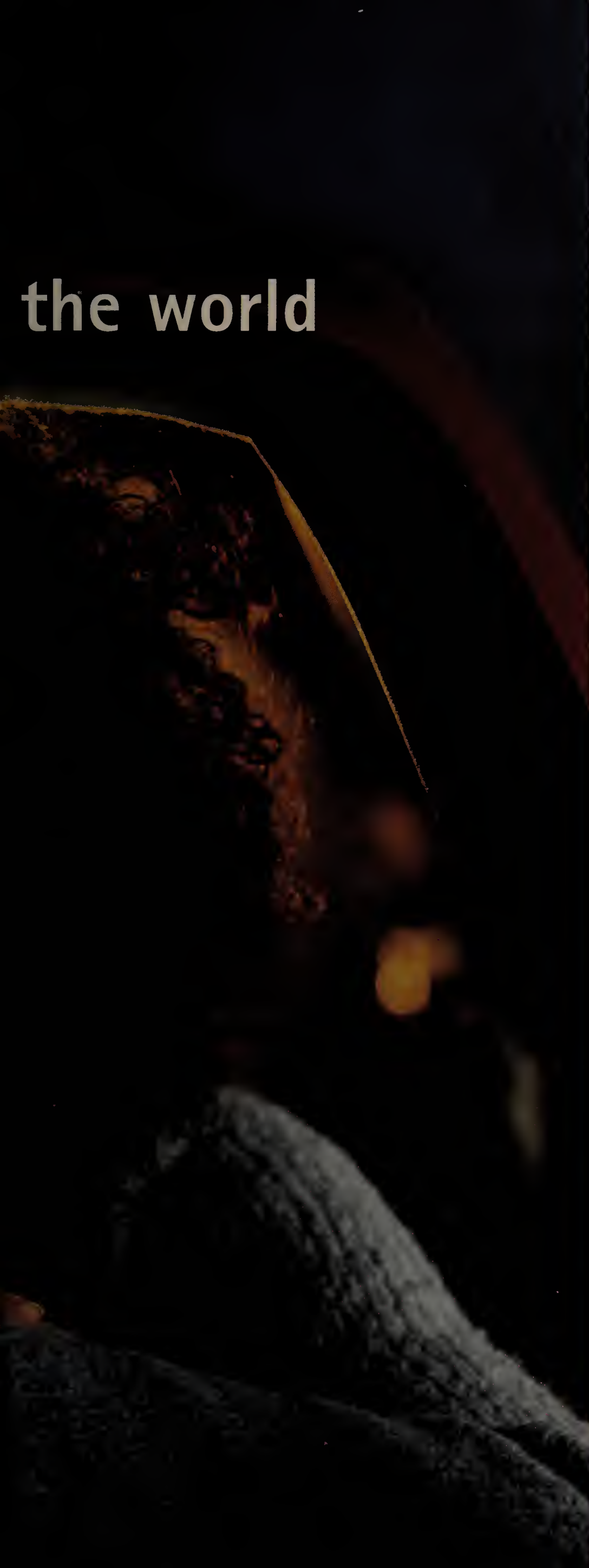
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STATE OF THE LAN: ENTERPRISE ENERGIZED

We recently wrapped up our fall "State of the LAN" tour, and it was a good one.

This time around, veteran network

executives from Alcatel, Avaya, Alteon (now a part of Nortel Networks), Extreme Networks, Hubbell Premise Wiring and Marconi joined me and *Net-*

work World Editorial Director John Galant for the tour.

The impression I'm left with after the many hours of discussion and scores of

questions is that we are on the verge of major corporate changes. The fundamental restructuring of business around the Internet model is affecting — and energizing — corporations. Many advancements put into place to power high-end, "carrier-class" Internet environments such as Yahoo and Amazon.com are finding their way into products with enterprise-level price tags resulting in a dizzying array of building blocks for our campus nets.

With the influx of new technologies, they'll be no dearth of work for network architects. The biggest challenge will be taking it all in. Here's a summary of some key trends discussed at the show:

- **10-Gigabit Ethernet.** While we won't see an official standard until early 2002 with some prestandard gear rolling out a bit earlier, 10-Gigabit Ethernet (over fiber) will be the natural uplink/backbone technology to link all that Gigabit Ethernet you'll be rolling out. This gear will not only help you on the LAN front, but also will likely find fairly extensive deployment in metropolitan-area networks.

- **Layer 4+ Switching.** Why stop at Layer 3 when you can keep climbing up the stack and get more granular control? With gear already shipping, you can look as deep in the packet as you wish and direct traffic to specific servers or bump up priority.

The arrival of Layer 4+ switching doesn't mean that Layer 2 and Layer 3 are passé. Higher-layer switching will be deployed at specific points in the network (such as in front of a high-use e-commerce server) rather than being enabled on every switch on campus.

- **Network Management.** This still tends to lag behind performance and new features on vendors' to-do lists. Despite customer talk about the importance of network management, it still doesn't play a critical role in the buying process. You need to let vendors know how important it really is.

- **Security.** This will permeate our campus networks more and more. Whether it's in the form of Secure Sockets Layer transactions flowing across the LAN or improved authentication, security will vary by company. Some people are even talking about personal firewalls and encrypted sessions on campus. Good security measures, but take heed: Placing the responsibility for Triple-DES encryption/decryption on our general-purpose client and server PCs may seriously degrade user sessions.

Finally, expect to see these technologies integrated in different ways. Firewalls in switches, cryptographic processors on server network interface cards, and so on. It will become more difficult to classify the products we deal with.

Tolly is chairman and CEO of Tolly Research. He is also founder, president and CEO of The Tolly Group. He may be reached at ktolly@tolly.com.

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spread the beam, diffusing power and thus increasing susceptibility to inclement weather.

Canobeam III also features a one-piece design, where the controller is built into the head unit, as well as SNMP (optional). For more detailed monitoring of the DT-50, the unit features a Remote Monitoring Function in which an RS-232C cable is connected between the unit and a PC.

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Net.Worker

Products, services and strategies for tying teleworkers to the enterprise

Briefs

The smart connected neighborhood is just around the corner. The **home networking semiconductor market** — which will enable the distribution of data, voice and video traffic throughout the home — is expected to more than quintuple from \$116 million this year to \$669 million by 2004, according to research from Cahners In-Stat Group.

Radiata and Sharewave announced plans to co-develop the first 802.11a wireless networking products for homes and businesses. Allowing for speeds up to 54M bit/sec, the specification paves the way for development of an array of multimedia and workgroup applications. Radiata provides 802.11a chipset, while Sharewave brings its media access control technology.

Radiata: www.radiata.com;
Sharewave: www.sharewave.com

For small offices seeking stronger security, **Intel** announced the Express 8205 VPN Broadband Router, a router/VPN combination that supports unlimited users and can establish secure VPN tunnels with 50 other locations. Using Triple-DES IP Security encryption, the router provides VPN throughput up to 1.3 M bit/sec. The Express 8205 will cost \$899. Intel: www.intel.com

Cable will continue to outpace DSL as the preferred residential broadband method for the foreseeable future, according to research by **DataQuest**. The number of cable modems subscribers will reach 3.3 million this year, climbing to 14 million by 2004. In contrast, DSL services will reach 1.4 million this year, but number only 9.8 million by 2004.

Shoreline makes VoIP for the home

Workaholic executives and call center challenges drive market expansion.

BY TONI KISTNER

In extending the corporate office to the home — whether as part of a formal telework program or to satisfy top executives clamoring for 'round-the-clock connectivity — the PBX invariably becomes a brick wall.

When remote workers ask for the same seamless access to their office voice systems as they enjoy for data, they find it can't be done — at least not without a lot of time, trouble and expense.

As a whole, traditional PBXs are difficult to manage and costly to support. Worse is their inflexibility. Circuit-switched PBX systems were never meant to be pushed to the home, let alone serve occasional teleworkers who work at home as it suits their schedules.

As companies look to their next-generation phone system, IP-based PBXs are looking increasingly attractive, especially to organizations in which workers are fanning out under a variety of scenarios. A combined voice and data infrastructure means simplified management and a single support staff, plus the ability to provide remote and roving workers features such as teleconferencing, call forwarding, caller

ID and voice mail — all on a standard analog phone. Because the telephone and PC are integrated, users can manage voice mail the same way they do e-mail.

While voice-over-IP technologies have been slow to take off, momentum is beginning to build due in part to workers' changing work styles, coupled with the high availability of residential broadband services.

A recent Yankee Group report predicts shipments of IP-PBX phone systems will eclipse traditional PBX systems by 2005. Companies vying for this emerging market include Cisco, 3Com and small players Sphere and Shoreline Communications, among others.

A year ago, Ken Denman banked on the future of IP voice services. Denman, a former US West and MediaOne executive, launched AuraServ, a Denver start-up that sells hosted voice services to small and midsize businesses. For its hardware platform, AuraServ partnered with Shoreline of Sunnyvale, Calif.

"We both saw that packet voice was going to become part of the corporate IT backbone," Denman says. "Shoreline's vision best fit our own."

AuraServ first rolled out service in



AuraServ's Ken Denman has high hopes for packet voice.

April. Subscribers range from single-site companies to a company with 26 sites. AuraServ also uses Shoreline's system for its own corporate voice network, linking the main office in Denver with offices in Seattle and Dallas. A link to the Boston office is in the works.

See **VoIP**, page 38

Net managers find (remote) backing up hard to do

BY DENI CONNOR

In-house workers take data backup for granted. Whether they store files and folders on the network or local drives, invariably there's a back-up product in place should their systems fail. But when workers telework, back-up strategies come unglued or cease to apply altogether.

A report compiled by analyst firm State-logic Research showed that only 22% of large companies conduct remote backups — pointing to the difficulty of the task. Difficult or not, there are a number of ways to capture remote data. Some are easy — scheduled and automatic — others tougher to enforce and dependent on workers' willingness to take part in the back-up process.

Consider whether your remote workers maintain persistent network connec-

tions, dial in occasionally or work disconnectedly. You probably have a mix of each and will want to tailor your remote workers solutions to fit their work habits.

For remote users who have a persistent connection to the network through a VPN or remote-access software, backup is pain-

less. You need to adopt a policy that corporate information stays on the network, and personal information on a local disk — and make sure your remote workers understand the policy and adhere to it.

Network giant Novell says about 45% of its users travel or work remotely from laptops and other devices. Novell gives these workers a portal into the network via a Web site called i-Login.nct. i-Login is available whenever a remote user establishes an Internet connection.

"i-Login gives employees access to the information and services that apply to their jobs, whether they're in human resources or sales," says Ken Anderson, chief information officer of Novell in Provo, Utah. "This gathering place of information for every employee reduces the time it takes to access Web-based

See **Backup**, page 38

www.nwfusion.com

REMOTE CONTROL

Get the lowdown on remote back-up strategies in our Net.Worker forum.



find it 2127 online

VoIP,
continued from page 37

Shoreline's IP Voice Communication System includes stackable voice switches in 12- and 24-port configurations. Applications on a Windows NT server provide call management and integrated messaging functionality for single users, workgroups and call center environments.

"Any standard phone plugged in to the Shoreline system can take advantage of all the advanced enterprise applications," says Barry Castle, Shoreline's vice president of product marketing.

Another benefit of an IP voice network is toll bypass, or the ability to transmit long-distance calls over the Internet then hop onto the public switched network to complete the call. Of course the long-distance portion of that call is virtually free. However, Castle points out that cost shouldn't be the driving factor in looking at a voice-over-IP system. Companies are negotiating 2- and 3-cent per minute long-distance plans, he says, and wonders,

"How much lower can they go than 2 cents?"

Gunning for home workers

Just recently, Shoreline extended its voice platform to remote workers with the announcement of the ShoreGear-Teleworker, a four-port voice switch. The box connects standard analog telephones and fax machines to the corporate IP voice network using DSL, extending all features of the enterprise product to the home. Calls are automatically routed to the home office, complete with personal greetings, voice mail settings and call handling options. All features are managed from a user's desktop PC.

The product is aimed primarily at two segments: business executives who need anytime access to corporate communications systems, and call centers and customer relationship management-type environments looking to

expand beyond their office boundaries.

"We haven't publicly announced the Teleworker box yet, but demand is very high already," AuraServ's Denman

Gear-Teleworker in a handful of customer and employee sites, including Denman's home.

"I am the test bed for our company," Denman laughs. "Before we try things with com-

the way he works. "I spend less time telling people where they can reach me. Instead, I just use my office number as a primary reach-me point. Even when people call me early or late, I don't

have to give out my home number. That's another layer of privacy you don't have to peel back."

For better or worse, voice over IP has helped extend Denman's work day.

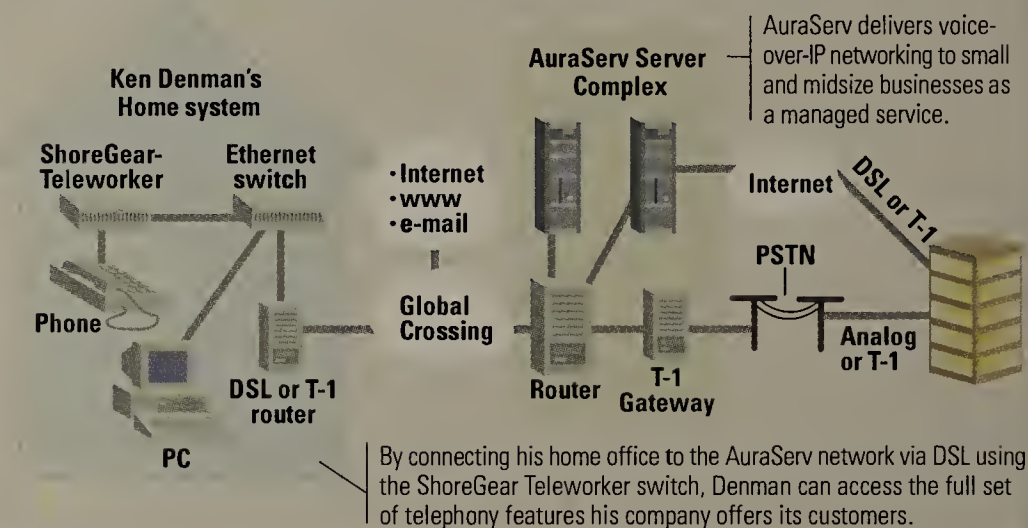
"First thing in the morning I can check my voice mail and e-mail. East Coast people can call the office first thing and get me," he says. "Since I'm in the office 70 to 80 hours a week normally, now I can get that up to 100 hours a week. It might not be perfectly healthy,

but it's important for me. It's not a balanced life, but it's the way I need to live as a start-up."

Shoreline: www.goshoreline.com; AuraServ: www.aura-serv.com

At a glance: AuraServ's voice services network

Flexibility and a wealth of telephony features make voice-over-IP networks the perfect fit for companies — large and small — with remote and roving workers.



says. "Our customers — corporate executives — are saying 'I need it now, I want it. I understand it's a beta [version]. When can you get it here?'"

AuraServ is testing Shore-

panies, I like to try them myself. I'm testing it with DSL now, and plan to test it with ISDN and my T-1 line soon, too."

Denman admits the ShoreGear-Teleworker has changed

Backup,
continued from page 37

applications, whether the user's in a home office, a hotel in Bangalore or the airport in Paris."

Upon logon, all of an employee's word processing, e-mail or database applications are available. If a user transfers a file from the document management system to work offline, the next time the user logs on the data is synchronized and transferred back to the server where it is backed up.

Data synchronization tools are also good for backup. Medical research service Medline uses Xcellenet's Afaria, which synchronizes data from the laptops or handheld devices of more than 500 sales representatives over an IP connection.

"We use Afaria to move data out to our sales force," says Scott Perry, systems programmer for Medline in Mundelein, Ill. "They enter orders offline, and then when they connect to the network Afaria synchronizes those orders with the network."

Afaria can run whenever the software senses a Web connection or can be initiated by the user. It starts at \$5,000 per Win-

dows NT or 2000 server, and about \$100 per user.

But what about disconnected users — those who may only logon for their corporate e-mail and rarely access networked applications and data? Some IT managers say that unless the corporate data stays on the network where it belongs, it's not their responsibility to back it up. Others say they've started thinking about backing up the disconnected user.

"All our users are on the network except one," says Chip DiComo, network manager for shipping company Hellman Worldwide Logistics in Miami. "We use [Computer Associates'] ARCserve on our server and the client agent to back up the laptops. We back laptops up only when they're on the LAN and ask users to bring their laptops into the office once a week so we can back them up."

Even with the best plans, DiComo has a one-user office in Charlotte, N.C., that doesn't get backed up. DiComo has-

n't "found the perfect balance yet."

For neglected users, IT managers might consider Web-based storage services such as FreeDrive.com and Xdrive.com. There are also utilities you can pass along to remote users such as Microsoft Backup, which

comes with Windows 95, or software such as NovaStor's NovaBackup or NovaWEB. Backup lets you filter the files you will backup by date last modified, by file name or location. NovaStor's NovaBackup offers a scheduler and compression capabilities.

Other vendors offer complete backup and disk restoration services, such as SecondCopy.com. Its downloadable software lets users schedule unattended backups to a different directory, disk, Zip drive, CD-R/W drive or a remote network drive. SecondCopy 2000 is \$30.

Another option is Connected, which provides back-up services in several ways: as software a company buys to backup its remote users; as a hosted service; or as an online service for individual users. Whether a company buys the Connected TLM software or decides to outsource backup to Connected,

the TLM software gathers information from laptops or desktops whenever the user connects to the Internet or has an IP connection established. If Connected is hosting the software, data is stored in a center operated by Connected.

At Bentley College in Waltham, Mass., Tracy Logan, vice president of IT, installed Connected TLM for use by teaching staff. About 25% of the professors use laptops and either dial in to the network or work offline, Logan says.

For network-connected users, their data is backed up as part of the network. For those that dial in, the Connected TLM uploads the data from their local disks to the network each time they connect.

"The [Connected] application runs in the background, and the user doesn't even know it until they lose their files and we're able to restore files for them," Logan explains. "We realized how many people don't practice regular back-up procedures. Before we used Connected, a lot of people had corporate data that didn't get backed up. If we roll Connected out to students, it's going to be a pretty significant program." ■

Watch your back

Four ways to back up remote users' data:

Stand-alone laptop back-up software (licensed by number of users)

NovaStor NovaNET	www.novastor.com
HP SureStore AutoBackup	www.hp.com
Microsoft BackUp	www.microsoft.com

Connected remote users (licensed by number of users)

Computer Associates ARCserve	www.cai.com
Legato Networker Remote	www.legato.com
Veritas TeleBackup	www.veritas.com

Free Web-based storage services

FreeDrive	www.freedrive.com
DriveWay	www.driveway.com
Xdrive	www.xdrive.com

Pay-for Web-based storage services (pricing varies)

BackupNet International	www.backupnet.com
eVault	www.evault.com
SecondCopy	www.secondcopy.com

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areas of our lab test."*
Internet Week

*"Shoreline has both the reliability and
scalability to be a real force in the industry."*
Joseph Gagan, Yankee Group

"BEST OF SHOW"
N+I Las Vegas

*"Shoreline is setting the standard for
IP voice communications."*
Brian Strachman, Cahners In-Stat

*"This is the type of IP voice communications
system that the market needs now."*
William Hills, Aberdeen Group

"BEST OF BREED" for Shoreline IP Voice Switches
Internet Week

*"Shoreline's system is polished; there are no
rough edges. VOIP voice quality is excellent."*
Business Communications Review

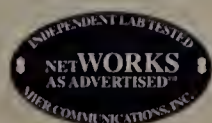
*"The flexibility of Shoreline's
architecture makes it ideal for
Enterprise and Service Provider
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**Paul Johnson,
Robertson Stephens**



The **emerging leader** in **IP voice communications**, that's who.

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1. What is the principal business activity at your location? (check ONE only)

01. ☐ Manufacturing (other)	10. ☐ Education	18. ☐ Other (please specify)
02. ☐ Finance/Banking	11. ☐ Government/Military/Aerospace	
03. ☐ Insurance/Real Estate/Legal	12. ☐ Consulting (Independent) *	
04. ☐ Health Care Services	13. ☐ Communications Carriers	*Attn Consultants, Integrators, Distributors, Resellers: Please complete form based on ALL clients and your own business needs
05. ☐ Hospitality/Entertainment/Recreation	14. ☐ ISP	
06. ☐ Media/TV/Cable/Radio/Print	15. ☐ ASP	
07. ☐ Retail/Wholesale Trade/Business Services	16. ☐ Manufacturing (Computer/Communications/OEM)	
08. ☐ Transportation	17. ☐ Resellers/VARS/VADs/Integrators/Distributors* (Computers/Communications)*	
09. ☐ Utilities/Process Industries/Mining, Construction, Petroleum, Refining, Agriculture, Forestry		

2. P: What is your primary job function? (check ONE only)
S: What is your secondary job function? (check ALL that apply)

P	S	P	S	P	S
☐ 1. ☐ Network Management	☐ 5. ☐ Internet/Intranet/E-Commerce Management	☐ 8. ☐ Consultant (Independent)		☐ 9. ☐ Other (please specify)	
☐ 2. ☐ LAN Management	☐ 6. ☐ Engineering Management				
☐ 3. ☐ Datacom/Telecom Management	☐ 7. ☐ Corporate Management (CEO, COO, CFO, Pres., VP, Dir., Mgr.)				
☐ 4. ☐ CIO/CTO/IS/IT/MIS/Systems Management					

3. What is the estimated value of Network equipment and services that you specify, recommend, or approve the purchase of?
 (Please print the appropriate number code on the line next to each product category. Please complete ALL categories A-D.)

1. \$100 Million or more	A _____ Large Systems (Mainframes/Minis)	H _____ Internet networking (including Routers, Switches)
2. \$50 Million to \$99.9 Million	B _____ Desktops (Micros/Laptops/Workstations)	I _____ Internet/Web/E-commerce
3. \$25 Million to \$49.9 Million	C _____ Mobile (including PDAs, Wireless)	J _____ Intranet/Extranet
4. \$10 Million to \$24.9 Million	D _____ Servers	K _____ Remote Access
5. \$1 Million to \$9.9 Million	E _____ LANs	L _____ Peripherals
6. \$100,000 to \$999,999	F _____ WAN Equipment	M _____ Software
7. \$50,000 to \$99,999	G _____ Carrier Services	N _____ Services/Support
8. Under \$50,000		O _____ Storage
9. None of the above		

4. What is the total number of sites for which you have purchase influence? (check ONE only)

1. ☐ 100+ 2. ☐ 50 to 99 3. ☐ 20 to 49 4. ☐ 10 to 19 5. ☐ 2 to 9 6. ☐ 1 7. ☐ None

5. What is the total number of Servers/Clients/LANs installed/planned at your location/in your entire organization? (check ONE box in each column)

SERVERS		CLIENTS		LANs	
At Location	Entire Org.	At Location	Entire Org.	At Location	Entire Org.
A	B	C	D	E	F
☐ 1. 50,000+	☐	☐ 1. 50,000+	☐	☐ 1. 50,000+	☐
☐ 2. 10,000 to 49,999	☐	☐ 2. 10,000 to 49,999	☐	☐ 2. 10,000 to 49,999	☐
☐ 3. 1,000 to 9,999	☐	☐ 3. 1,000 to 9,999	☐	☐ 3. 1,000 to 9,999	☐
☐ 4. 100 to 999	☐	☐ 4. 100 to 999	☐	☐ 4. 100 to 999	☐
☐ 5. 50 to 99	☐	☐ 5. 50 to 99	☐	☐ 5. 50 to 99	☐
☐ 6. 10 to 49	☐	☐ 6. 10 to 49	☐	☐ 6. 10 to 49	☐
☐ 7. 1 to 9	☐	☐ 7. 1 to 9	☐	☐ 7. 1 to 9	☐
☐ 8. none	☐	☐ 8. none	☐	☐ 8. none	☐

6. What is your scope and involvement in purchasing decisions for network products and services for your enterprise?

A. Scope (check ONE only)	B. Involvement (check ALL that apply)
CORPORATE:	
1. ☐ Entire Enterprise/Multiple Enterprises	1. ☐ Create Network/IT Strategy
2. ☐ Division/Multiple Divisions	2. ☐ Recommend/Specify Brand
3. ☐ Department	3. ☐ Approve Purchase
4. ☐ None	4. ☐ Evaluate Products/Services
	5. ☐ Determine the Need
	6. ☐ None

7. What is the estimated number of employees at your location/in entire organization? (check ONE in each section)

A. At your location:	B. Entire organization:
1. ☐ Over 20,000	1. ☐ Over 20,000
2. ☐ 10,000 - 19,999	2. ☐ 10,000 - 19,999
3. ☐ 5,000 - 9,999	3. ☐ 5,000 - 9,999
4. ☐ 2,500 - 4,999	4. ☐ 2,500 - 4,999
5. ☐ 1,000 - 2,499	5. ☐ 1,000 - 2,499
6. ☐ 500 - 999	6. ☐ 500 - 999
7. ☐ 250 - 499	7. ☐ 499 or less
8. ☐ 100 - 249	
9. ☐ 99 or less	

8. Please indicate the Internet/Intranet/WAN/LAN/Remote products/services that you are currently involved in purchasing or plan to purchase (check ALL that apply)

A. Currently involved in purchasing			B. Plan to purchase		
INTERNET/INTRANET					
A	B	A	B	A	B
☐ 01. ☐ VPN Equipment	☐ 07. ☐ Web Hosting	☐ 13. ☐ Web Based Collaboration/Groupware			
☐ 02. ☐ VPN Services	☐ 08. ☐ Content Hosting	☐ 14. ☐ Web Acceleration/Caching/Load Balancing Products			
☐ 03. ☐ Firewalls/Security/Encryption	☐ 09. ☐ Traffic Management	☐ 15. ☐ Other Internet/Intranet			
☐ 04. ☐ Electronic Commerce Tools	☐ 10. ☐ Web Development Tools				
☐ 05. ☐ Web Servers/Software	☐ 11. ☐ Management/Monitoring Software				
☐ 06. ☐ Internet Services	☐ 12. ☐ Web Based Management Tools				
LANs/INTERNETWORKING					
A	B	A	B	A	B
☐ 16. ☐ Local-Area Networks	☐ 26. ☐ Layer 4-7 Switches	☐ 34. ☐ Hubs/Intelligent Hubs/Stackable Hubs			
☐ 17. ☐ Network Operating System Software (NOS)	☐ 27. ☐ ATM Switches	☐ 35. ☐ Cables, Connectors, Baluns			
☐ 18. ☐ Intel Based Servers	☐ 28. ☐ Token-Ring Switches	☐ 36. ☐ Management Frameworks			
☐ 19. ☐ Intel Based Multiprocessor Servers	☐ 29. ☐ Network Storage (NAS, SANs)	☐ 37. ☐ Call Center Tools			
☐ 20. ☐ RISC Based Servers	☐ 30. ☐ Storage/Backup (Optical, Disk, Tape, RAID)	☐ 38. ☐ Voice over LAN			
☐ 21. ☐ Clustered Servers	☐ 31. ☐ Network Test/Diagnostic Tools	☐ 39. ☐ Other Local-Area Network/Internetworking			
☐ 22. ☐ Print Servers	☐ 32. ☐ UPS				
☐ 23. ☐ Routers	☐ 33. ☐ Network Interface Cards (NICs, PCMCIA)				
☐ 24. ☐ Layer 2 Switches					
☐ 25. ☐ Layer 3 Switches					
REMOTE/WIRELESS					
A	B	A	B	A	B
☐ 40. ☐ PDAs	☐ 42. ☐ Remote Access Services	☐ 44. ☐ Other Remote/Wireless			
☐ 41. ☐ Remote Access Products	☐ 43. ☐ Wireless Data Equipment/Services				
WAN EQUIPMENT & SERVICES					
A	B	A	B	A	B
☐ 45. ☐ Modems	☐ 51. ☐ FT-I/T-I/T-3 Services	☐ 58. ☐ Managed LAN/Router Services			
☐ 46. ☐ Cable Modems	☐ 52. ☐ xDSL Services/Products	☐ 59. ☐ Fax Servers/Services			
☐ 47. ☐ Asynchronous Transfer Mode (ATM)	☐ 53. ☐ Diagnostic/Test Equipment	☐ 60. ☐ Other WAN Equipment/Services			
☐ 48. ☐ Frame Relay Equipment including FRADs	☐ 54. ☐ DSU/CSU				
☐ 49. ☐ Frame Relay Services	☐ 55. ☐ PBXs	None of the above (1 - 60)			
☐ 50. ☐ ISDN Equipment/Services	☐ 56. ☐ Voice/Video over IP Gateways				
	☐ 57. ☐ Videoconferencing				

9. Please indicate the Network hardware/software/services that you are currently involved in purchasing or plan to purchase: (check ALL that apply)

A. Currently involved in purchasing			B. Plan to purchase		
SYSTEMS/PERIPHERALS					
A	B	A	B	A	B
☐ 01. ☐ Laptops/Notebooks	☐ 05. ☐ Storage/Backup (Optical, Disk, Tape, RAID)	☐ 08. ☐ Minis			
☐ 02. ☐ PCs	☐ 06. ☐ Printers	☐ 09. ☐ Mainframes			
☐ 03. ☐ Windows Terminals/Thin Clients	☐ 07. ☐ Printer/Fax/Copier Hybrids (Multifunction Printers)	☐ 10. ☐ Fax/Modem Boards			
☐ 04. ☐ Workstations		☐ 11. ☐ Memory/Chips/Boards/Cards			
SOFTWARE/APPLICATIONS					
A	B	A	B	A	B
☐ 13. ☐ Network Management (incl. SNMP)	☐ 20. ☐ Groupware	☐ 27. ☐ Document Management			
☐ 14. ☐ Systems Management	☐ 21. ☐ E-Mail	☐ 28. ☐ Site Metering Tools			
☐ 15. ☐ Security	☐ 22. ☐ Enterprise Resource Planning (ERP)	☐ 29. ☐ Data Warehousing			
☐ 16. ☐ Directory Services	☐ 23. ☐ EDI	☐ 30. ☐ Anti Virus Software			
☐ 17. ☐ Operating Systems	☐ 24. ☐ Desktop Videoconferencing	☐ 31. ☐ Multimedia			
☐ 18. ☐ Applications Development Tools	☐ 25. ☐ Imaging	☐ 32. ☐ Helpdesk			
☐ 19. ☐ Database Management/RDBMS	☐ 26. ☐ Middleware/Serverware	☐ 33. ☐ Other Software/Applications			
SERVICES					
A	B	A	B	A	B
☐ 34. ☐ BPO (Business Process Outsourcing incl. Financial Services, HR, Logistics, etc.)	☐ 35. ☐ ASP Services	☐ 38. ☐ Education/Training Services			
	☐ 36. ☐ Call Center Outsourcing	☐ 39. ☐ Other Services			
	☐ 37. ☐ Systems Integration/Consulting	None of the above (1 - 39)			

10. Please indicate the platforms that are currently installed/planned: (check ALL that apply)

A. Currently installed			B. Planned for purchase		
NETWORK PROTOCOLS					
A	B	A	B	A	B
☐ 01. ☐ TCP/IP	☐ 05. ☐ APPC/APPN/LLU 6.2	☐ 09. ☐ HTTP			
☐ 02. ☐ IPv6	☐ 06. ☐ NETBIOS/NETBUEI	☐ 10. ☐ Other Network Protocols			
☐ 03. ☐ SNA	☐ 07. ☐ NFS				
☐ 04. ☐ Novell IPX/SPX	☐ 08. ☐ SNMP				
LAN/WAN ENVIRONMENT					
A	B	A	B	A	B
☐ 11. ☐ Gigabit Ethernet	☐ 17. ☐ Layer 3/4 Switching	☐ 23. ☐ DSL			
☐ 12. ☐ Switched Ethernet	☐ 18. ☐ FDDI	☐ 24. ☐ ISDN			
☐ 13. ☐ Fast Ethernet	☐ 19. ☐ 100Base-T	☐ 25. ☐ Frame Relay			
☐ 14. ☐ Ethernet	☐ 20. ☐ 10Base-T	☐ 26. ☐ Private Line T1, T3, FT-1, SONET			
☐ 15. ☐ ATM	☐ 21. ☐ Fibre Channel	☐ 27. ☐ Other LAN/WAN Environment			
☐ 16. ☐ Token Ring/Token Ring Switching	☐ 22. ☐ Wireless LANs				
NETWORK OPERATING SYSTEM					
A	B	A	B	A	B
☐ 28. ☐ Windows NT/Windows 2000	☐ 31. ☐ Novell (NetWare 2.X,3.X)	☐ 34. ☐ Banyan (Vines)			
☐ 29. ☐ Novell (NetWare 5.X)	☐ 32. ☐ LINUX	☐ 35. ☐ IBM (LAN Server)			
☐ 30. ☐ Novell (NetWare 4.X)	☐ 33. ☐ Microsoft (LAN Manager)	☐ 36. ☐ Other Network Operating System			
COMPUTER OPERATING SYSTEM					
A	B	A	B	A	B
☐ 37. ☐ NT Workstation	☐ 42. ☐ LINUX	☐ 47. ☐ Digital VMS			
☐ 38. ☐ Windows 2000	☐ 43. ☐ DOS	☐ 48. ☐ Macintosh			
☐ 39. ☐ Windows 98/95/3.1	☐ 44. ☐ OS/2, OS/2 WARP	☐ 49. ☐ Other Computer Operating System			
☐ 40. ☐ Intel based UNIX	☐ 45. ☐ OS/400				
☐ 41. ☐ RISC based UNIX (incl. SOLARIS)	☐ 46. ☐ IBM MVS/VM/SE/ESA	None of the above (1 - 49)			

11. Which of the following hardware platforms are installed/planned in your company? (check ALL that apply)

A - Mainframes (Large Scale)	B - Minis (Midrange)	C - Workstations
1. ☐ IBM	1. ☐ IBM RS/6000	1. ☐ Sun Microsystems
2. ☐ Other	2. ☐ IBM AS/400	2. ☐ H-P
	3. ☐ Digital/Tandem/Compaq	3. ☐ Digital/Compaq
	4. ☐ Unisys	4. ☐ IBM
	5. ☐ H-P	5. ☐ Silicon Graphics
	6. ☐ Other	6. ☐ Other

12. What is the estimated gross revenue of your entire company/institution? (check ONE only)

1. ☐ \$20 Billion or More	5. ☐ \$100 Million to \$499.9 Million	9. ☐ \$4.9 Million or Less
2. ☐ \$10 Billion to \$19.9 Billion	6. ☐ \$50 Million to \$99.9 Million	10. ☐ None of the above
3. ☐ \$1 Billion to \$9.9 Billion	7. ☐ \$10 Million to \$49.9 Million	
4. ☐ \$500 Million to \$999.9 Million	8. ☐ \$5 Million to \$9.9 Million	

13. For which areas outside of the U.S.A. do you have purchase influence? (check ALL that apply)

1. ☐ Europe	3. ☐ South America	5. ☐ Middle East	7. ☐ Canada
2. ☐ Asia	4. ☐ Australia	6. ☐ Africa	8. ☐ None

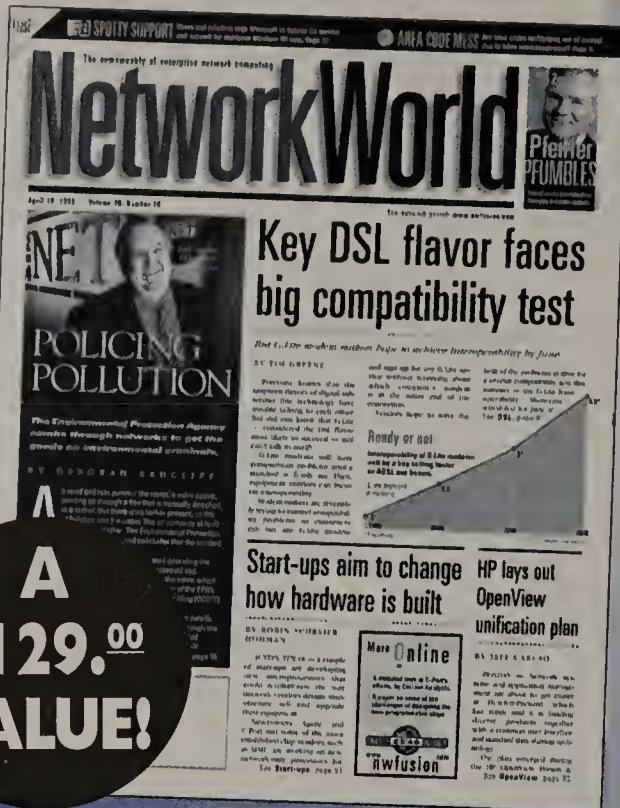
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Briefs

Cox Communications will support cable modem services using IP data gear from ADC. Cox says the equipment will initially let the company offer high-speed Internet access to customers. As ADC upgrades its Cuda 12000 switches to the most recent cable modem standards, the gear will also be able to handle IP voice traffic.

www.cox.com

Optical networking provider **GiantLoop** introduced a portfolio of professional and network services designed for large enterprise storage applications last week. Called **Optical Storage Networking**, the service will let customers move multiple storage protocols, such as Enterprise Systems Connection, FICON and Fibre Channel. Through the service, GiantLoop will help customers design, implement and manage their storage networks. Optical Storage Networking is backed by a 99.99% availability service-level agreement.

GiantLoop: www.giantloop.com

DSL provider **DSLnet** in New Haven, Conn., recently announced that it is reducing its workforce until it finds more financing. DSLnet will cut 141 employees — about 28% of its workforce. DSLnet estimates the cuts will reduce the company's spending by approximately \$8 million in 2001. Keith Markley, DSLnet's president and chief operating officer, says the company will also be slowing the expansion of its network to concentrate on areas DSLnet already serves. DSLnet's move came days after DSL provider Covad announced it would cut jobs and slow down its network rollout to reduce its expenses. DSLnet offers services in more than 375 cities.

DSLnet: www.dsl.net

AT&T Wireless maps major 3G plan

BY DENISE PAPPALARDO

AT&T Wireless has set the stage for third-generation (3G) high-speed wireless data, but the accompanying script is not without risk.

After announcing late last month that NTT DoCoMo is taking a 16% stake in the company, AT&T Wireless also revealed plans to update its Time Division Multiple Access network.

Early next year the service provider will deploy Global Systems for Mobile communications (GSM) gear over its TDMA network. The GSM overlay will also include general packet radio service enhancements that can support wireless data transmissions at up to 144K bit/sec.

Starting in late 2001, AT&T intends to upgrade its network again with Enhanced Data rates for Global Evolution-compliant gear that will boost the data transmission rates up to 384K bit/sec before its inevitable step to 3G.

In 2002, another upgrade based on the Universal Mobile Telecommunications System (UMTS) specification will let the service provider support up to 3G data

AT&T Wireless puts its 3G plans on the table

AT&T Wireless says it will be one of the first U.S. service providers to deploy a third-generation network. Here's how the company is mapping out its strategy:

Early 2001:

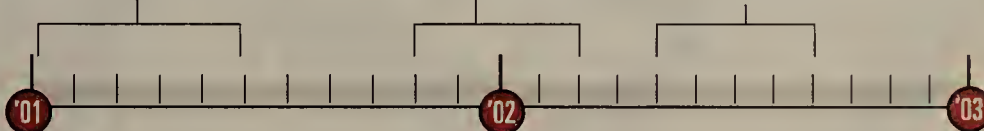
Deploy an overlay GSM/GPRS network on existing TDMA network.

Late 2001/Early 2002:

Deploy EDGE network equipment to double wireless data speeds.

Mid 2002:

Deploy 3G UMTS equipment and handheld devices as available.



Terms:

- **Time Division Multiple Access (TDMA):** Legacy cellular and PCS voice network infrastructure.
- **Global Systems for Mobile communications (GSM):** A digital cellular and PCS network specification that's primarily used outside the U.S.
- **General Packet Radio Services (GPRS):** Considered a 2.5G technology, a GSM enhancement that supports wireless data transmissions at up to 144K bit/sec.
- **Enhanced Data rates for Global Evolution (EDGE):** A technology upgrade for GSM and TDMA networks, which supports wireless data transmissions at up to 384K bit/sec.
- **Universal Mobile Telecommunications System (UMTS):** Generally a European third-generation standard, which supports wireless data transmissions at up to 2M bit/sec.

speeds at 2M bit/sec. UMTS is also sometimes referred to as Wideband Code Division Multiple Access.

The company's plan seems cumbersome, going through at least four upgrades to reach 3G compliance, but each step

offers incremental improvement.

"The plan raises questions about additional costs and frequency planning," says Elliot Hamilton, senior vice president at Strategis Group. With multiple standards See **AT&T Wireless**, page 44

Intermedia serves up national DSL with security

BY TIM GREENE

TAMPA, FLA. — Intermedia Communications is introducing a nationwide DSL service that includes options for firewalls, VPNs and Web hosting, and also makes it easier and quicker for companies to network over the Internet.

Called Intermedia DSL, the service can link far-flung branch offices with each other as well as headquarters — sites that might otherwise be restricted to using dial-up Internet access because faster options cost too much.

Customers can buy the service at symmetrical upload and download speeds ranging from 128K bit/sec to 1.5M bit/sec. Customers can also buy asymmetric DSL (ADSL) with a maximum download speed of 8.1M bit/sec. Upload speed for ADSL is 1.5M bit/sec, the company says.

Companies with dispersed branches and telecommuters could use the service to avoid dealing with the individual regional Bell operating companies that set

up DSL lines. They also avoid distributing the hardware and software needed to network the DSL-connected sites by having Intermedia take care of that for them.

The average time between ordering and getting the service turned up is 22 days, the firm says.

Intermedia is expanding its area of DSL coverage from about a dozen cities to 1,300 through an arrangement with

Rhythms NetConnections, a nationwide DSL provider. This is happening while other national DSL efforts are stumbling. Verizon just canceled its planned takeover of DSL provider NorthPoint Communications. Jato Communications canceled its national plans, as did Comdisco with its DSL arm called Prism.

Other providers such as DSL Networks and SBC Communications offer DSL services nationwide.

Customers should note that WorldCom is in the process of buying Intermedia for its ISP and Web-hosting arm, Digex, and it is unclear what WorldCom's plans are for the rest of the company.

Intermedia manages its DSL service and installs a variety of customer-site equipment depending on customer needs. Hardware options include gear from Cisco, Netopia and WatchGuard Technologies, as well as software from Axent and Check Point.

For example, a customer that already See **Intermedia**, page 44

Intermedia DSL

Intermedia Communications has added the following features to its DSL service:

- Nationwide coverage with partner Rhythms NetConnections
- Download speeds ranging from 128K bit/sec to 8.1M bit/sec
- VPN option
- Firewall option
- Telephone-based backup

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For more on Qwest's unique approach to integration, visit us at qwest.com or call 1 800 RIDE QWEST. Then you can get on with running your business.



AT&T Wireless,
continued from page 41

and technologies that the firm is proposing, users will need trimode handsets, he says. AT&T is expected to invest millions in new equipment and spectrum.

AT&T plans to deploy equipment

from Nokia, Ericsson, Nortel Networks and Lucent that supports up to three modes of wireless traffic.

Last week, the Federal Communications Commission revealed the names of 87 service providers that plan to bid on the personal communications services (PCS) C-block re-auction this week. Most

of these licenses were returned because of nonpayment. AT&T Wireless has deposited the largest cash reserve of \$151 million to bid for C-block licenses. The company is looking to beef up cities where it only has 5 MHz or 10 MHz worth of spectrum, says Bob Egan, research director at Gartner Group.

"This is the most credible story to come out of AT&T Wireless in five years," Egan says. "It's about time [CEO] John Zeglis bellied up to the bar and said what to do with this company."

For years AT&T Wireless has been under scrutiny because its network was running out of space in major markets. Some of the problems had to do with spectrum allocation and how the network was being managed, but lately the company has gotten past those issues. Many saw the TDMA network as a cross AT&T Wireless must bear, but the company's new plan lifts that burden.

However, Zeglis claims the TDMA network is not being replaced, but upgraded to support 3G specifications.

Essentially all other PCS and digital cellular network services providers are mapping out similar strategies, but providers such as Verizon Wireless and Sprint PCS will not have to spend as much on upgrades, Egan says. Sprint PCS will have to deploy new hardware and software, but because its network is based on a single, newer technology the upgrades are not believed to be as costly.

Although AT&T Wireless may have to spend more, the firm will have an asset — international reach — that others can't touch.

"Sprint PCS will look like an isolated island after AT&T's deal goes through," Egan says. Sprint PCS can strike a deal with an international wireless service provider, but CDMA is generally a U.S. technology. Nearly all providers outside the U.S. have GSM networks.

AT&T Wireless and NTT DoCoMo, the largest wireless service provider in Japan, say that each will sell wireless services to multinational business users in the U.S. and Japan, respectively.

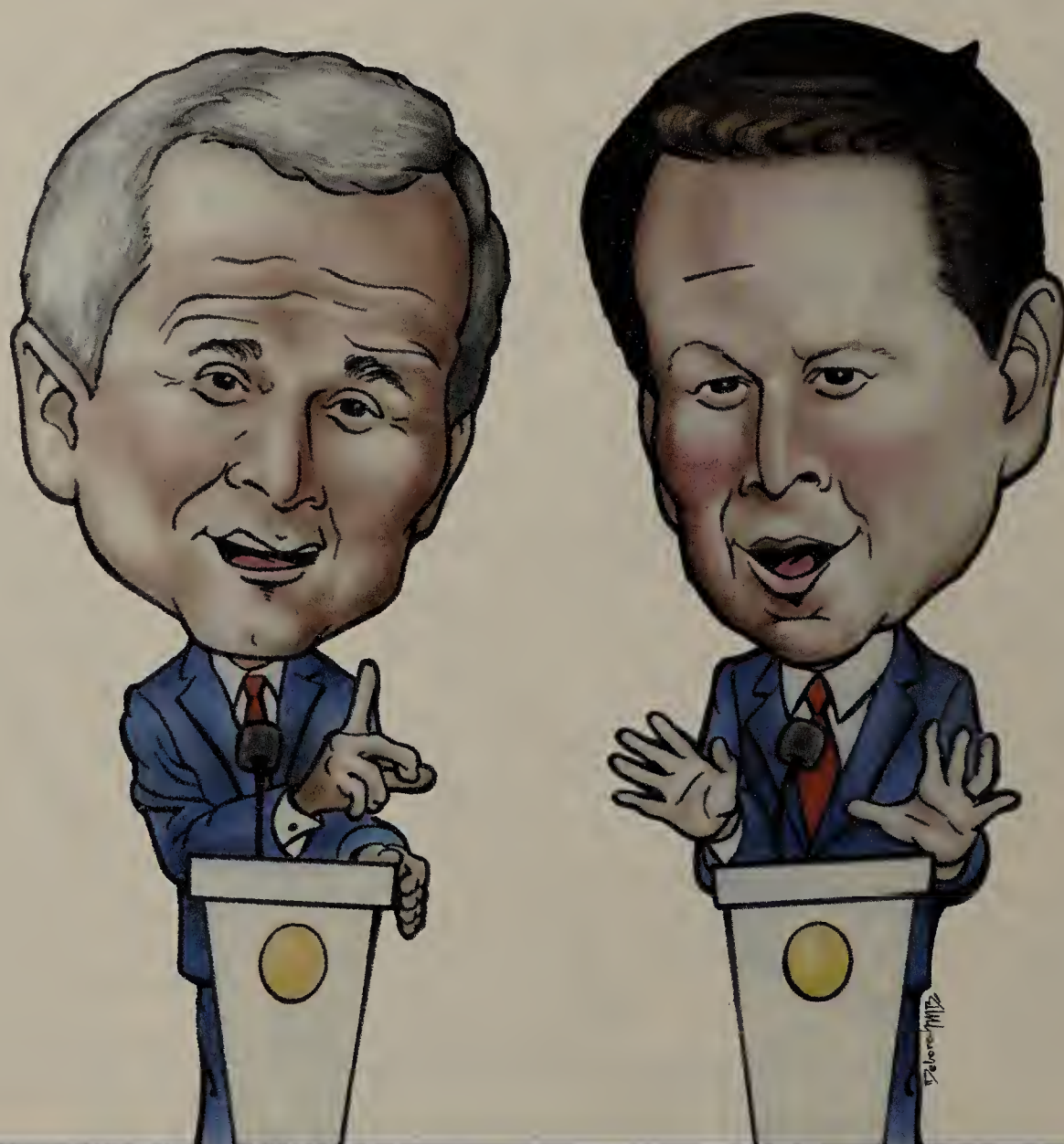
"The next part of the story is BT," Egan adds. AT&T has a relationship with British Telecom through their Concert joint venture. It's likely that NTT DoCoMo and AT&T Wireless will try to strike a deal with BT's wireless group, he says. ▣

Intermedia,
continued from page 41

has a central site connected to the Internet via a T-1 line and a Cisco router might also opt for Cisco gear in its remote offices. Another customer that wants its Internet connection backed up if the DSL lines fail could choose a Netopia router that automatically dials the Internet via a 56K bit/sec modem on a separate phone line if the DSL connection breaks.

Basic service that includes Internet access and e-mail costs \$139 per month for a 128K bit/sec connection and climbs to \$999 per month for an 8.1M bit/sec connection. Dial backup costs \$15 per month more and requires a separate phone line.

Intermedia offers Web hosting starting at \$20 per month for 20M bytes.



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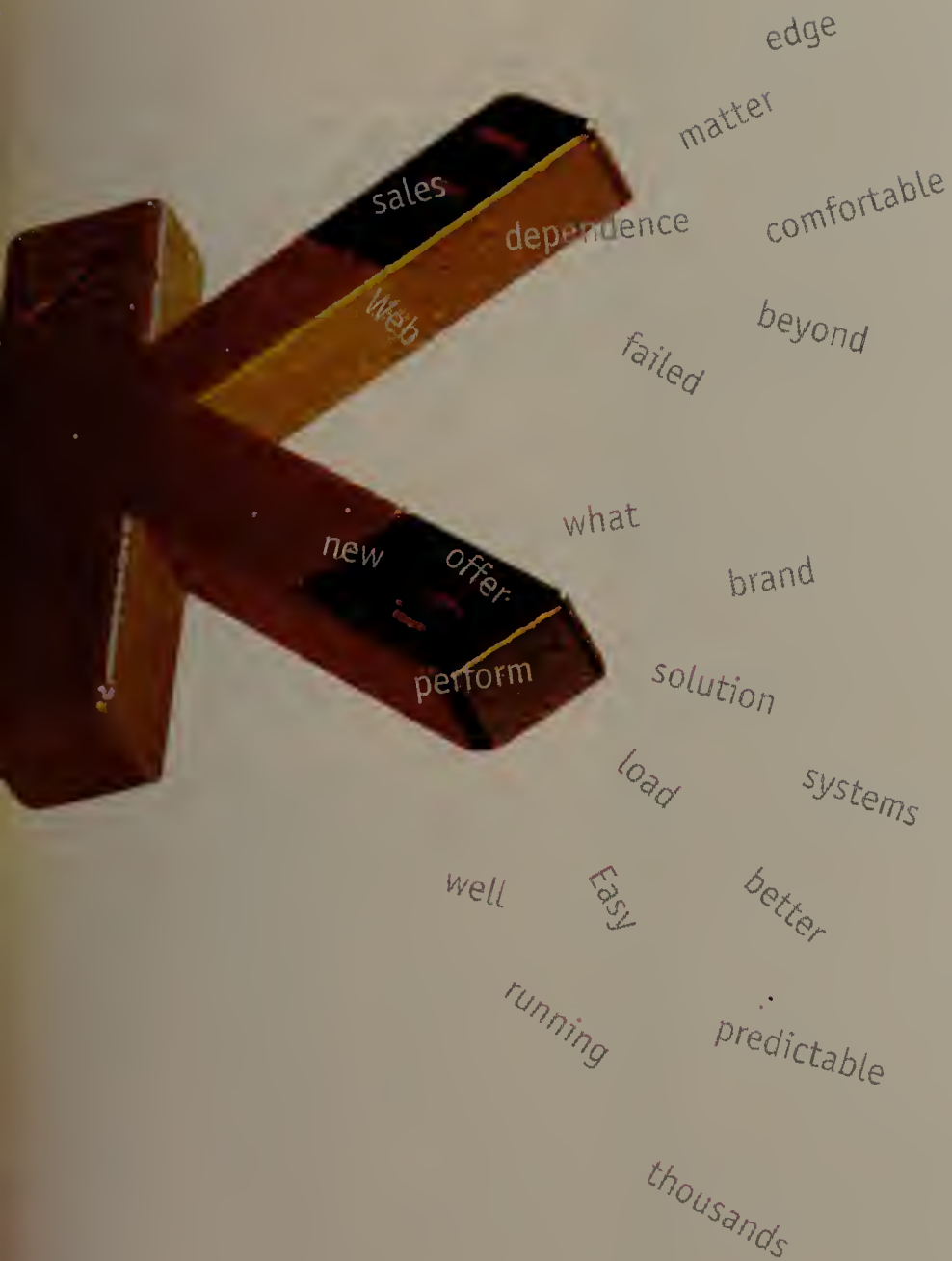


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Eye on the carriers . David Rohde

CARRIERS ON RECESS NEED PLAYGROUND MONITOR

Have you ever had trouble completing a call, accused the person you were calling of having something wrong with his phone and later

realized the problem was on your end? I can't explain this failing of human nature, but I can relate it to the ongoing farce of my new office attempting

to get telecom service from BroadBand Office (BBO).

When we left this story last week BBO had failed to order loops from Ver-

izon on time, and we were still waiting 10 days after our move. Now 14 days after the move, all the lines were in, but BBO hadn't ported our phone numbers from our previous location, and we still had no voice mail.

I had a phone appointment with a California start-up and couldn't get through to the executive. A recording kept coming on telling me to dial a customer service number. I tried the executive's public relations person in the same area. Same recording. I fired off an e-mail to the PR person telling her their phone lines were fouled up.

Then I called someone in New York. I got the same recording. It dawned on me to try the 800 number on the recording. "Hello, welcome to Qwest Communications. If you have a question about your bill, press 1..."

Aha! On checking, a BBO official confirmed that BBO resells Qwest long-distance and guessed the problem: "Qwest thinks these are fraudulent calls, and they've put a block on them." He then told Qwest we were legit and got them to unblock the calls.

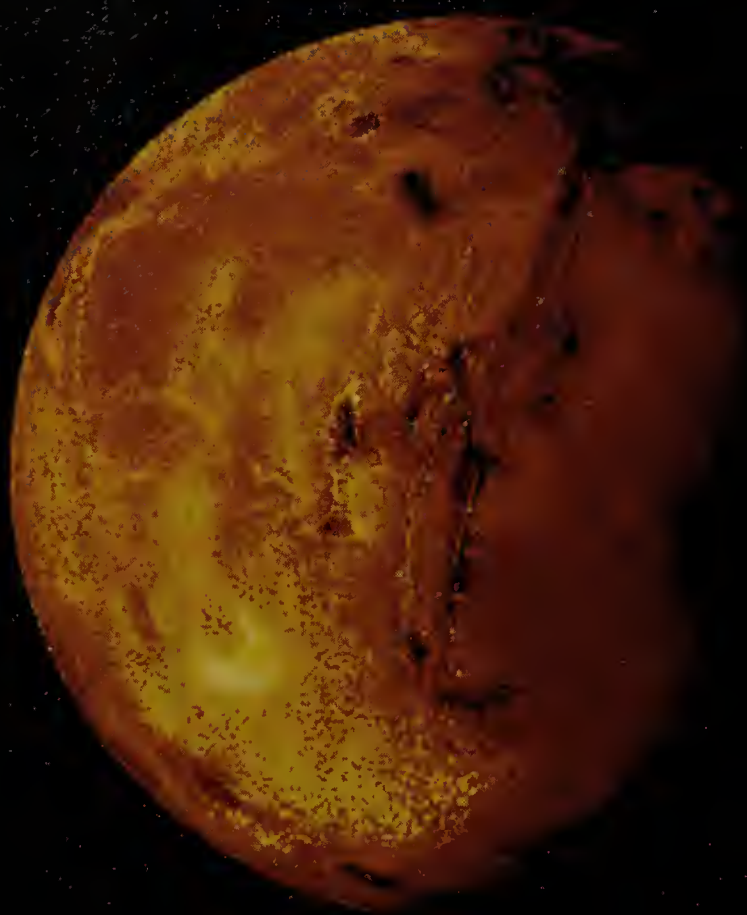
Just three hours earlier several BBO execs apologized profusely to me for our problems, but then blamed the number-portability delay on Verizon — which can't seem to port numbers coming from one competitive local exchange carrier (we used to have WorldCom) to another. On the 17th day post-move, BBO finally worked a call-forwarding arrangement with WorldCom along with — miracle of miracles — voice mail.

Now let's get real. The fundamental problem is BBO isn't really providing any of these services: local phone trunks (Verizon), long-distance (Qwest), voice mail (American Voicemail) or phone numbers (Lord knows who owns phone numbers). This is rampant today, even when the services work.

A *Network World* online forum inspired by columnist Kevin Tolly's difficulty with Verizon DSL prompted a telling comment by a network-integration official at Deloitte Consulting in Chicago. He says he's a satisfied customer of Concentric DSL but adds: "I was astounded by the huge number of companies involved with the installation and the complexity with which they must react. There were no fewer than four companies involved: Concentric.net; Covad Communications; XO Communications; and, of course, Ameritech. I received e-mails from all four, and if I were not a telecom professional I might not have understood the process they were executing."

Who says enterprise network management is a dying art? Someone has to manage all these carriers if they can't do it themselves.

Robde is managing editor of The Edge section of Network World. He can be reached at drobde@nww.com.



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BLECs are building a name in broadband for buildings

BY MICHAEL MARTIN

T managers of businesses housed in multitenant buildings are having to familiarize themselves with a different breed of carrier: building local exchange carriers.

Unlike their competitive local exchange carrier (CLEC) and incumbent (ILEC) counterparts, BLECs are concerned exclusively with bringing data and voice services to office towers, industrial parks, hotels and apartment complexes. While CLECs and ILECs focus on building out broadband networks that terminate at the edges of buildings, BLECs concentrate on running broadband inside buildings.

"The goal of a BLEC is to create an in-building broadband network," says Steven Weinberg, an analyst with Chicago research firm New Paradigm Resources. "Their strategy is often to partner with a real estate manager to bring added value to buildings. The managers can use the broadband services as a selling point."

There are several potential advantages BLECs can bring to building owners and their tenants.

Businesses that stand to gain the most are those located in office complexes that are too far from a telco central office to get DSL service and too remote to be passed by a cable provider's network. Most of these businesses are small and midsize organizations, or branch offices of larger companies, and can't justify several thousand dollars per month for a T-1.

Market demand

Jeff Moore, an analyst with market research firm Current Analysis, notes that most office buildings in the U.S. don't have fiber connections, so there is a market for BLEC services.

BLECs typically bring broadband into a building by installing a DSL Access Multiplexer (DSLAM), Ethernet switch or ATM switch in the building's basement. These basement boxes connect back to a telco central office via T-1 or T-3 connections. Tenants who want to subscribe to the BLEC's services are then connected to the switch or DSLAM. The more tenants that sign up for a BLEC's service, the more bandwidth the BLEC provides between the central office and the building.

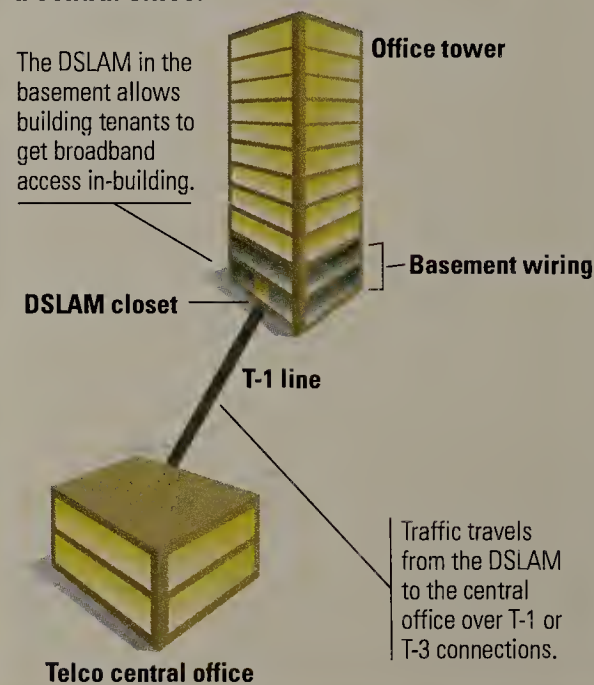
Some BLECs provide voice services in addition to basic broadband data. Edge Connections, which serves customers in Atlanta, Boston, New York and Washington, D.C., is one such provider, using DSLAMs and voice gateways to enable voice service over DSL. Other BLECs rely on ATM to provide voice services.

Some BLECs are looking to bring value-added data services to building tenants. Everest Broadband Networks, which has more than 600 buildings under contract in the U.S. and Canada, offers e-mail and Web hosting services to its clients, says

THE ABCS OF BLECS
BLECs offer high-speed connections in buildings and other facilities that might otherwise go without.

In-building broadband

Many BLECs bring broadband to buildings by installing a DSLAM in the building's wiring closet and running T-1s or T-3s between the DSLAM and a central office.



spokesman Mike Granieri. Next year, Everest plans to expand its value-added services portfolio by allowing customers to purchase applications from multiple application service providers (ASP) through Everest. Customers will access those applications through a portal that requires only one user identification and logon — an in-building version of what ASP aggregators such as Jamcracker and Agiliti are offering.

The service advantage

One not-so-obvious potential benefit BLECs can offer building tenants is superior service. While out-of-building ILECs and CLECs can take weeks to provision new services for tenants, BLECs can often provision the same service in days because they already have most of the equipment they need on

hand in the building, Weinberg says.

BLECs aren't the only carriers that offer in-building broadband services. Some CLECs are also getting into the market. For Vitts Networks, a Manchester, N.H., CLEC, in-building broadband services are a growing part of the provider's business.

Drake Hill Commons, a leasing agent and tenant of a North Hampton, N.H., office complex, recently contracted with Vitts to provide broadband services to the complex's tenants. Drake Hill real estate broker Mark Lacombe says his company needed a provider for in-building broadband because the complex is more than five miles from the nearest central office, well outside the range of DSL. Selling office space would be difficult without the broadband option, Lacombe notes.

"Almost everyone needs connectivity beyond dialup," he says.

To serve the complex, Vitts installed a DSLAM on-site. Vitts has two T-1s running between the DSLAM and the nearest central office, but can increase the bandwidth if required, says Bill Creamer, Vitts' executive vice president of sales.

Drake Hill and two other building tenants are currently getting 270K bit/sec service, while another tenant has a 780K bit/sec connection. Vitts also provides the businesses with e-mail.

Lacombe says an important part of Vitts' service is that Vitts takes care of all the billing.

"We didn't want to saddle the property manager with having to worry about billing," Lacombe says. "So whoever came to provide service to the building had to do a breakdown and bill each tenant individually."

Do your research

While BLECs can provide corporate tenants with services they might not be able to get from other providers, potential BLEC customers should research their providers before signing a contract, experts advise.

Like many CLECs, some BLECs have been hammered by the stock market. For example, Allied Riser Communications, a Dallas-based BLEC serving 53 metropolitan areas, was trading at \$48.75 in March and was down to less than \$2 as of late November. Cypress Communications, an Atlanta-based BLEC with operations in 23 markets, had a 52-week high of \$29.93, but was recently trading at less than \$1.

Another factor to consider is that many BLECs know the real estate market better than they know the telecommunications market.

"Many of these companies are rooted in the real estate business and the question is how much they know about telco," New Paradigm's Weinberg says. Because BLECs must themselves buy telecommunications services such as T-1s and T-3s from third parties, BLEC customers should research the reliability of the BLEC's provider, he adds. ▀



One lost document can bring an entire office to its knees. (Just ask my former employer.)

It costs, on average, \$250 to re-create a lost document. Which for a small business or workgroup typically adds up to \$20,000 a year. If you lose a very important document, it can get worse. I learned that at my last job.

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I lost the Davis file, he didn't
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The Edge

Service provider developments at the juncture between the enterprise and the new public network

Briefs

AT&T is trying to hold back the floodgates against possible regulation of cable lines that would force the company to allow in all ISPs. In comments to the Federal Communications Commission following the FCC's recent agreement to study the issue, AT&T lauded the agency's existing policy of "vigilant restraint."

"The wisdom of the FCC's deregulatory policy is evident by the steady growth in cable modem subscribers and the aggressive deployment of competing broadband services such as DSL," says Jim Cicconi, AT&T general counsel. "Regulation would only slow delivery of these new services."

DSL is going around the world. DSL access multiplexer vendor Copper Mountain signed a deal with the Singaporean company Pacific Internet to install Copper Mountain gear in six Asian territories. The deal includes equipment for the central office and customer premises. Pacific Internet will offer broadband DSL in Singapore, Hong Kong, the Philippines, India, Thailand and Australia.

Broadband carrier Williams Communications struck a reciprocal deal with specialized network interconnection provider Universal Access. Williams agreed to locate termination gear in Universal Access' Universal Transport Exchange facilities, which are designed to create a meet-up point for service provider nets, such as regional and national backbones. Universal Access will provision circuits for Williams' service provider customers using its Universal Information Exchange (UIX) database of proprietary carrier information. The UIX contains information on each carrier's capacity, availability and pricing.

Williams: www.williamscom.com; Universal Access: www.universalaccess.net

Gig Ethernet challenges ATM for MAN

SONET-based networks retain reliability edge while Ethernet pushes price, bandwidth options.

BY MICHAEL MARTIN

Gigabit Ethernet is expanding into more metropolitan-area networks, but don't expect Ethernet to supplant ATM and SONET in the MAN anytime soon.

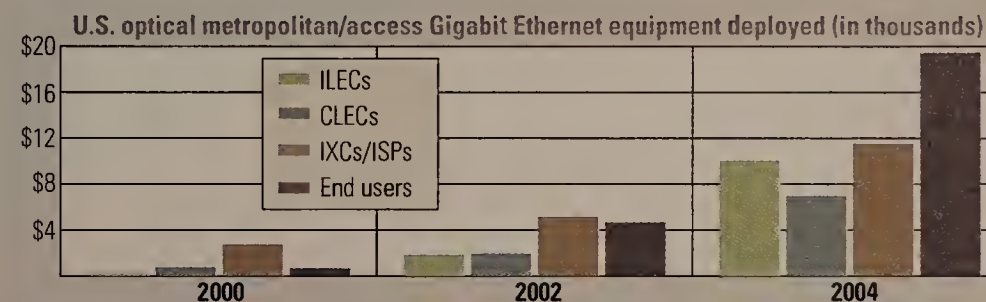
While Gigabit Ethernet offers application service providers, ISPs and companies cheap, scalable bandwidth, it doesn't yet offer the same carrier-class reliability that ATM and SONET provide.

Gigabit Ethernet in the MAN is definitely a growing business. Among metropolitan Ethernet providers, Yipes now serves 18 cities, Telson serves 17, and Cogent last month launched FiberCity, a unit serving the multitenant market.

The appeal of metropolitan Ethernet providers is obvious — lots of band-

Gigabit Ethernet growing

Gigabit Ethernet metropolitan deployments are expected to grow in all market segments over the next several years.



SOURCE: COMMUNICATIONS INDUSTRY RESEARCHERS

width at low prices. Cogent, for example, is serving up 100M bit/sec connections for \$1,000 per month — about the price of a 1.5M bit/sec T-1 service from a tradi-

tional carrier.

But traditional carriers are still investing heavily in SONET and ATM equipment. See **Ethernet**, page 58

Astral Point boosts optical access aggregation

Company's ON 2000 fills gap in product line, but cost questions arise.

BY JIM DUFFY

CHELMSFORD, MASS. — Astral Point Communications has extended its metropolitan optical portfolio downward by introducing an access platform that aggregates multiple low-speed lines to provision multiple services to companies.

The new ON 2000 is positioned as a bandwidth management and service aggregation platform for metropolitan networks, including multitenant buildings, rather than a feeder for the long haul. Approximately 80% of new services now terminate in points of presence (POP) within metropolitan networks, with only 20% passed through to the long haul, Astral Point says.

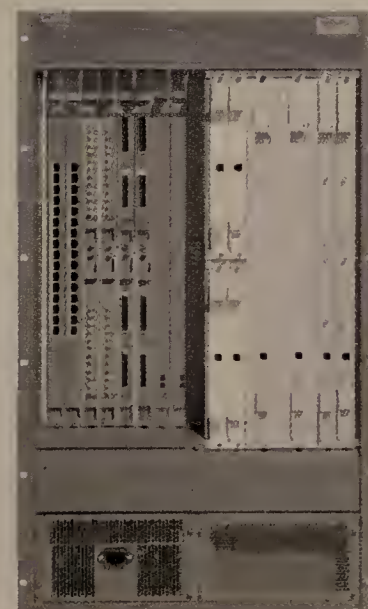
The ON 2000 Optical Access Node is a broadband service aggregation system for lines terminating in the metropolitan network. It provisions services such as T-1/T-3 voice trunking, business access DSL, Internet access and Ethernet with virtual LAN support.

The access node aggregates DSL access multiplexer traffic for transport to dense wave division multiplexed

networks at bandwidths up to OC-48. It also supports native wavelength services, packet services and aggregation of multiple ON 2000 traffic onto a higher-end Astral Point ON 5000 Optical Services Node in a metropolitan core to provide transport up to OC-192.

Service providers can use the ON 2000 to provision a variety of lambda services, including OC-3, OC-12, OC-48, OC-192, 10/100M bit/sec Ethernet, Gigabit Ethernet and Fibre Channel.

The ON 2000 can also provision leased-line services from DS-1 and DS-3 to OC-48. It also supports what Astral Point calls a 3:1:0 digital cross-connect, which lets carriers combine leased lines with optical services.



Astral Point's ON 2000 is designed for metropolitan service aggregation.

The ON 2000 supports the same Galaxy Distributed Control Plane software as the ON 5000. This software provides carrier-class protection and restoration, which Astral Point says differentiates the ON 2000 from aggregation gear from Unisphere and Equipe.

As a single node, the ON 2000 can replace up to four different and disparate pieces of equipment in a carrier network, including SONET add/drop muxes, digital cross-connects and Ethernet switches, Astral Point says.

Astral Point says the backlog for the ON 2000 is three for every ON 5000, which is in 18 customer locations now, as a potential replacement for Cisco's ONS 15454 optical transport system and Redback Networks' Smart-See **Astral Point**, page 58

A stylized illustration of a person with a light blue body and a smiling face. The person has four arms, each holding the hand of another person whose arm is visible. The arms are in various colors: two are light blue, one is green, and one is dark brown. The background is composed of large, abstract shapes in shades of orange and brown. The overall style is graphic and modern.

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Briefs

Concord Communications has announced its second application performance monitoring plug-in module. The AdvantEdge Internet Information Service (IIS) module is a plug-in to Concord's SystemEdge SNMP agent that monitors the performance of servers and the applications running on them. The agents can be configured to correct actions when performance thresholds aren't met. It is available now for \$1,750.

Concord: www.concord.com

Computer Associates has announced an add-on module to Unicenter TNG for managing PeopleSoft applications. Unicenter TNG PeopleSoft Option provides automated monitoring of PeopleSoft applications by enabling cross-application scheduling, event monitoring and automated action. Administrators can use Unicenter TNG to submit jobs, balance loads, monitor several tasks and obtain a centralized view of all related jobs. Unicenter TNG and its PeopleSoft Option are available now.

Computer Associates: www.ca.com

IBM has developed a new network security algorithm, which the company claims will reduce the time it takes to perform certain security-related tasks by up to 50%. The algorithm is capable of performing encryption and authentication functions in one step, reducing some workload on networks and attached devices. IBM hopes the algorithm will be used for securing Internet protocols, storage-area networks, fiber-optic networks and e-business applications. The National Institute of Standards and Technology will determine whether to recommend the algorithm for securing communications.

IBM: www.ibm.com

BoldFish unveils e-mail network

BY CAROLYN DUFFY MARSAN

SANTA CLARA — BoldFish next month will launch what it claims is the first dedicated network for outbound commercial e-mail that rides on the Internet's infrastructure.

The BoldFish Express Network is a private, secure, spam-free network available to companies that use e-mail to deliver newsletters, stock quotes, sales confirmations, promotions and invoices. Early customers include Accrue Software and Broadbase Software.

BoldFish sells server software for creating and sending large volumes of outbound commercial e-mail. BoldFish officials say the new network will let their software customers send thousands of e-mail messages per day faster and more securely without impacting their network infrastructure.

The software, which runs on a Unix or Windows NT server, lets users create high-volume e-mail messages with a point-and-click interface.

"As companies increasingly ramp up the amount of e-mail they send . . . it tends to put a strain on their [Simple Mail Transfer Protocol] relay services and the network infrastructure leading up to that," says Matt

PROFILE:
BOLDFISH

Location: Santa Clara

Founded: 1997

Primary Business: Server software and dedicated network for sending high volumes of outbound commercial e-mail.

CEO: Barbara Tallent

Financing: \$18 million in venture financing.

Employees: 70

Customers: Accrue Software, Colgate-Palmolive, Broadbase Software, Morgan Stanley Dean Witter.

Fun fact: ARPANET researcher Dave Crocker is a technical adviser to BoldFish.

Cain, a vice president at Meta Group.

"The attraction of the BoldFish Express Network is that it provides some intelligence outside the firewall, so you no longer have to assemble and send each of those e-mail messages on a one-off basis," Cain adds.

BoldFish Express Network will be sold on a usage basis, with prices starting at

\$5,000 per month for sending 100,000 messages that are each 10K bytes. BoldFish Express Server costs an additional \$30,000 per year for sending e-mail to 100,000 recipients.

Other companies offer fully outsourced commercial e-mail services, but BoldFish lets customers retain control over message creation while outsourcing the infrastructure for message delivery.

BoldFish's hybrid approach is attractive to Zing Network, an online photo-sharing community that uses BoldFish server software to send a newsletter to 1.5 million members every other week. With BoldFish, the process takes from 24 to 36 hours, compared to a week using hand-crafted scripts.

"The network is an excellent idea," says Richard Fall, vice president of engineering at Zing Network. "As we grow larger, we'll probably want to outsource the physical mailing infrastructure."

But Fall wants to retain control over e-mail creation. "More of the mailings we do are based on our members' recent activities and interests," he says. "That requires a very strong connection to our database of member activity, which is very difficult to outsource."

BoldFish: www.boldfish.com

Tivoli software watches over mainframe-based IP nets

BY DENISE DUBIE

AUSTIN, TEXAS — Users controlling IP resources with S/390 mainframes may be interested in an improved performance management package from Tivoli that monitors application response time, FTP transfers and network performance.

The product — NetView Performance Monitor for TCP/IP (NPM/IP) — lets network professionals monitor, identify and reduce IP network resource congestion, minimizing downtime and increasing application performance and availability.

NPM/IP also now lets users monitor CPU utilization and server volumes or load balance for heavily used IP stacks on the mainframe. Real-time views of FTP session logs will help net managers catch failed transfers before they create problems.

Managing IP resources from a mainframe is critical. Market research firm IDC says that by 2004 IP-based clients will constitute 94% of the host access

client units shipped, and users will find it increasingly important to monitor the performance and health of IP-based mainframe resources.

NPM/IP 1.2 is an S/390 mainframe application that monitors the IP stack and can be managed from a Windows PC or Web browser.

With NPM/IP, Tivoli is helping users marry their mainframe and IP environ-

ments, says Richard Ptak, a vice president at Hurwitz Group.

Audrey Rasmussen, research director at the Enterprise Management Associates consultancy, says products such as NPM/IP are ideal for mainframe owners to use in their transition over to e-business systems.

"With e-business, you can't wait. Tools such as [NPM/IP] can give mainframe users the immediate real-time visibility and control of their IP applications and transactions," she says.

NPM/IP requires OS/390 Version 2.7 or higher on the mainframe and Windows 95, 98 or NT for the workstation client. NPM/IP with the Windows graphical user interface is available now. NPM/IP with the Web browser interface will ship in March. Pricing for NPM will start at \$20,000 and could cost more than \$500,000, depending on the size of the S/390 server.

Tivoli: www.tivoli.com

www.nwfusion.com

AN EYE FOR PERFORMANCE

Take a closer look at mainframes monitoring for the IP environment.

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Taming the PDA monster to keep data current

TRG's InstallPro and ImagePro can save you time with Palm application installations.

BY TRAVIS BERKLEY,
NETWORK WORLD
GLOBAL TEST ALLIANCE

Attack of the 50-foot Palm Pilot! OK, so those cute little PDAs aren't that scary. But trying to manage them centrally can seem like facing down Mothra or Godzilla.

PDAs are moving into the enterprise as serious business tools. They can carry quotes, price lists, order forms, or even be a reference library, just to name a few applications. Keeping the data and programs current is your quest.

We tested two applications from TRG Products that try to meet these goals for Palm OS-compatible PDAs. ImagePro Deployment Manager allows central IT staff to create custom images of a PDA, either as a means of backup, or to easily roll out new releases of company software tools. The second application, InstallPro Application Guard, lets you

deploy a single application to a range of devices.

It takes a little experience to build images that suit your organization. But once you get the hang of it, ImagePro can save you a lot of time, especially if you need to roll out many devices of the same type and configuration. For developers who don't want to worry if someone

installs their application correctly, InstallPro can be just what the doctor ordered. The more complex your application, the more you may want to give InstallPro a good look.

Image is everything

Most large IT shops use some form of imaging software, such as Norton's Ghost or PowerQuest's Drive Image Pro, for desktop computers, especially on initial deployment. TRG has applied this same principle to Palm OS devices. An image can be created that contains all of the applications that users may need. Separate images can be

created for sales and engineering departments based on their needs. In addition, if you don't want to include the Graffiti tutorial or other applications, you could exclude them as you build your custom images.

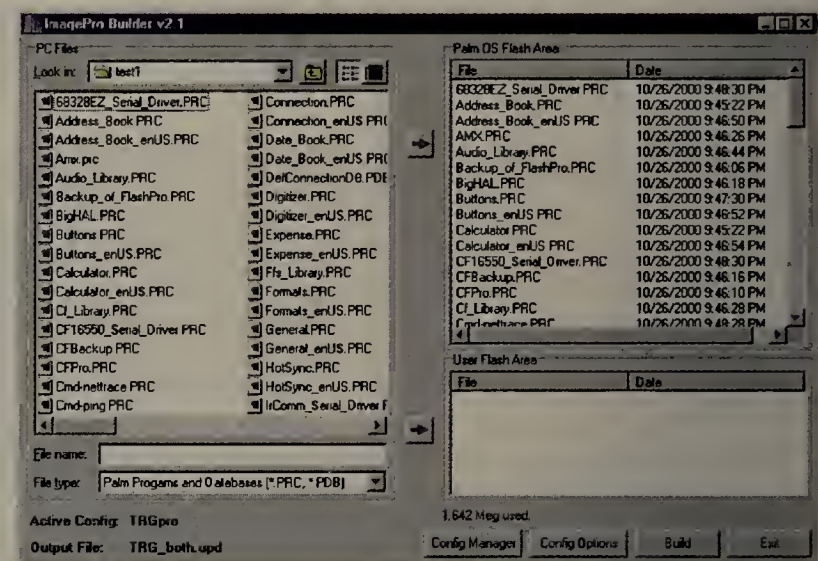
Each image is also specific to the hardware and memory size of the PDA. Even if the applications are the same, you'll need a separate image for a Palm IIIx, a TRGPro and an IBM WorkPad, for example.

Another interesting area is where you can store the applications on the PDA. Most Palm OS devices contain flash memory for the operating system to reside in. This is nonvolatile memory that can survive a hard reset and does not need battery power to remain in memory. Provided that there is room in flash, programs and read-only databases can be loaded into flash memory (data that is modified in flash memory can render the PDA unstable). So if someone lets the batteries go a little too long before replacing them, their programs are safe in flash.

Many feel flash that is not used by the operating system is simply unused space. Because the size of each operating system varies according to the device, it's hard to determine how much you'd have to work with. For example, the Palm VII technically has flash memory, but it's virtually unusable because the operating system uses all but a few bytes. The Palm III, on the other hand, uses barely 1M byte of the 2M bytes available.

An image can be made to only incorporate the flash memory, only the regular RAM, or both. If only the flash is updated, it leaves any additional programs and data the user has installed intact. But, if a "clean" refresh is desired, wiping away both the flash and the RAM is the way to go.

Finally, TRG has made it easy to image several devices concurrently. If your computer has serial port expansion hardware, such as Comtrol's RocketPort or the Digi Accelleport, you can take



ImagePro's edit screen lets you choose how to build the images for your PDAs.

advantage of TRG's Multiple Loader application. Up to 32 devices can be concurrently loaded. It takes 2M bytes of flash roughly 5 minutes to load, and 1M byte of RAM takes less than 2 minutes. Obviously, the faster the serial ports, the shorter the times.

When you consider that you can do up to 32 devices simultaneously, the overall installation time drops quickly.

While we did not have any of the serial port expansion hardware available for testing, we did use the Multiple Loader

See **TRG**, page 64

NetResults

ImagePro Deployment Manager

RATING: 8.40 **COMPANY:** TRG Products, (515) 252-7522, www.trgnet.com.
COST: \$5,000 for 200 devices. **PROS:** Easy to deploy new applications; can be used for disaster recovery; can place applications in flash memory. **CONS:** Serial port expansion hardware required for best time savings.

	Features 50%	Scalability 30%	Installation 10%	Documentation 10%	Total score
ImagePro	9	8	8	7	8.40

Individual category scores are based on a scale of 1 to 10. Percentages are the weight given each category in determining the total score. Scoring key: 10—Can't be better; 9-8—Excellent; 7—Very good; 6-5—Average; 4-2—Needs improvement; 1—Not supported or doesn't work.

InstallPro Application Guard

RATING: 8.40 **COMPANY:** TRG Products, (515) 252-7522, www.trgnet.com.
COST: Starts at \$1,500 for 1,000 images. **PROS:** Even large applications with many files install as a single file; can install to flash memory. **CONS:** Limited to one Creator ID per image.

	Features 60%	Installation 20%	Documentation 20%	Total score
InstallPro	9	8	7	8.40

Individual category scores are based on a scale of 1 to 10. Percentages are the weight given each category in determining the total score. Scoring key: 10—Can't be better; 9-8—Excellent; 7—Very good; 6-5—Average; 4-2—Needs improvement; 1—Not supported or doesn't work.

How We Did It

Our installation workstation was a Dell OptiPlex G1 with 128M bytes of RAM. We tested the two products using a TRGPro, courtesy of TRG Products, and two Palm IIIs.

We used ImagePro to create images with flash only, RAM only and both flash and RAM. We simulated various failures and data loss to see how quickly and easily we could get our information back.

To test the Multiple Loader application, we used a flash image at 1.3M bytes in size, and a RAM image of a mere 190K bytes. This combination uploaded consistently at 3 minutes, 38 seconds, within a second or two. We tried imaging two Palm IIIs at once. First, we started them at exactly the same time; next, the start was staggered by 30 seconds. In each case, the upload was 3 minutes, 38

seconds, the same time it took for one by itself.

TRG has some published benchmarks dealing with imaging up to 13 devices simultaneously. The company claims times to load a 1.7M-byte flash and 1M-byte RAM image to 13 devices at once is more than 7 minutes. Scaling our numbers from above yielded similar results. It is easy to see how someone could image several hundred, even a thousand devices in a day.

InstallPro was used to install applications into RAM only, flash only and a combination of the two. In building our custom images, we used a few shareware packages available on many Web sites.

In each case, we made sure there were several files to be installed. We also tested the uninstall option to see how well it cleaned up after itself.

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TRG,
continued from page 62

with the two serial ports in our Dell OptiPlex workstation. Whether we did one at a time, two simultaneously, or two with a staggered start time, the results were the same. (See "How We

Did It," page 62).

The installation was straightforward, with no noteworthy obstacles. The included documentation is fairly complete, even containing a list of error codes where appropriate. It is segmented into many parts, which may seem strange at first, but as the saying goes,

"form follows function." Each function, such as the RAM and flash extractors and the image builder, are separate programs, and therefore have separate manuals. There are overview documents to bring the pieces together, however. Once you get a feel for how the documentation is organized, it is

easy to find what you are looking for.

Simplify your life

The second product we tested, InstallPro Application Guard, makes it easy to install large or complex applications using standard HotSync technology. Applications that use many databases or have auxiliary programs can quickly make the number of files to install grow. This requires that the user get all of the files installed, or run the risk of not having the application work properly.

Here's where InstallPro works its magic. You can distill all of these files into a single install program that is synchronized to the PDA as one .prc installation file. From there, it installs all of the files and databases individually. In addition, InstallPro lets you install parts of your application into that coveted flash memory space.

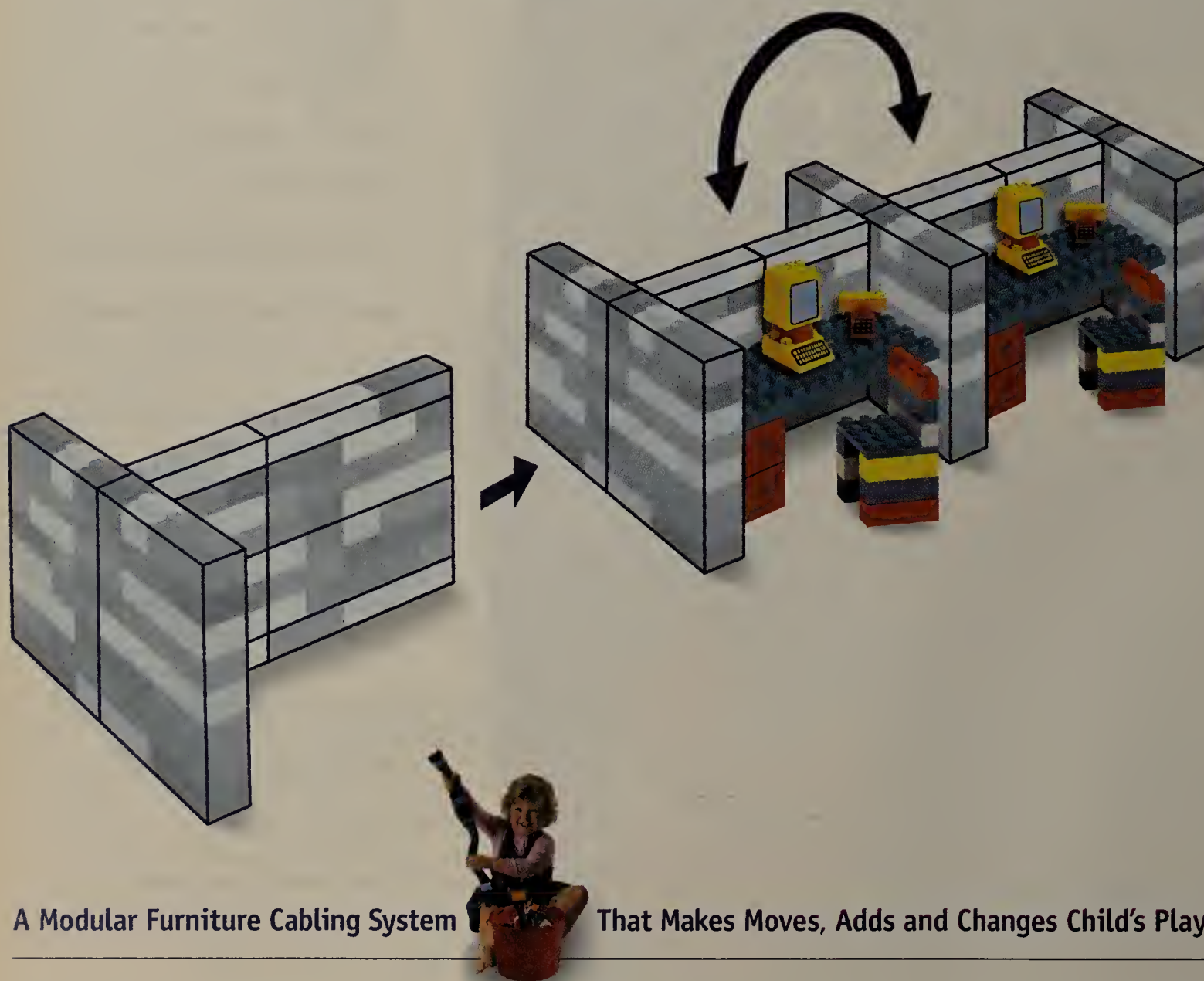
The final stroke is that you can create a companion .prc to use as an "uninstall" and clean up after itself. Normally when you delete an application, it deletes all databases with the same creator ID. But if your application uses several databases, the uninstall will ensure that everything added will be removed.

As before, InstallPro installs rather painlessly. The documentation is organized similarly to ImagePro's, with each program receiving its own manual.

ImagePro and InstallPro are great products. If your company uses (or plans to use) Palm OS-compatible PDAs with a core set of applications for a large number of users, ImagePro will save you a lot of time and headaches. If you're looking for a simple way to deliver a complex application, especially one that can install itself into nonvolatile flash memory, look no further than InstallPro.

Berkley is the supervisor of LAN Support Services at the University of Kansas. He can be reached at berkley@ukans.edu.

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'Net Insider . Scott Bradner

WISHING FOR WALLS

It would be easy to dismiss the French court action against Yahoo as a manifestation of ignorance of Internet technology, a throwback to the time of

Minitel or as being as well thought out as the Maginot line. But it seems the French court did know what it was doing, and that bodes ill for the future of

the Internet, at least in France.

It was not all that long ago that France could point with some pride to Minitel as the first general-use data network for the public. Minitel was a widely used text-based communications system with thousands of available services.

It was also a closed network. It was

confined to the borders of France and was not connected to other networks. Thus, it was easy for the French government or French courts to control what people could see when using Minitel.

Before World War II, France built what was touted as an impregnable wall along its border with Germany known as the Maginot line. But in a foreseeable move, the Germans just went around the end of the fortifications when it came time to invade France.

A few weeks ago, a French court told Yahoo that it had to make sure no French Internet users could view or buy Nazi materials on Yahoo Web sites. This would have been easy to do in the old Minitel days, but not so easy with the Internet. In particular, it would be trivial for any French Internet user to circumvent any barrier Yahoo could erect other than removing the Nazi material altogether.

The court was told that any Yahoo-

... It would be trivial for any French Internet user to circumvent any barrier Yahoo could erect other than removing the Nazi material altogether.

erected electronic Maginot line would not be particularly effective, but the court said it would be effective enough. If Yahoo does not comply, the fine is about \$13,000 per day — not a big deal, but a bad precedent indeed.

There are over 180 countries on the Internet. If the French action holds, (it may be overturned on appeal), it sets the precedent that would permit any country to define their own rules on what people can see or do on the 'Net. Companies that provide Internet-based services would then have to use different rules depending on where in the world the user was located. This would make doing business complicated, expensive and, if you don't know the rule of the moment for every locale, risky. This uncertainty will do little to increase Internet investment in places like France.

France has a reason to want to restrict Nazi materials. But it might be better off penalizing the possession of such materials, which is in its jurisdiction, rather than pretending to make a difference by closing a door standing by itself with no house around it to keep out the wind.

Disclaimer: Harvard has lots of doors, but some wind escapes anyway. The above wind is mine alone.

Bradner is a consultant with Harvard University's University Information Systems. He can be reached at sob@sobco.com.



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Technology Update

An Inside Look at the Technologies
and Standards Shaping Your Network

Ask Dr. Intranet

By Steve
Blass

We have two
LANs that need
to be connected
using PPP. The
hosts on LAN A con-
nect to a router that
can act as a dial-

out PPP server. On LAN B, a
Red Hat Linux PPP server is
set up for dial-in and is the
entry point to the hosts on
LAN B.

We can establish a link
from the router on LAN A to
the PPP server on LAN B, but
can't communicate from the
LAN A hosts to the LAN B
hosts.

Using tcpdump on the PPP
server on LAN B, we can see
packets being received, but
the PPP server isn't able to
communicate. The PPP server
on LAN B accepts the IP
address of the router on LAN
A instead of assigning it a
PPP IP address.

How do we set up the
routes so both LANs link?

First, enable IP forwarding
on your Red Hat PPP server.
You may need to rebuild the
kernel (cd/usr/src/linux; make
menuconfig; use the menu to
configure the networking
options to include IP forward-
ing and "Optimize as Router,"
and exit the menu; make bzIm-
age; install the new kernel and
reboot).

Second, make sure you
have the proper routes in
place. The router on LAN A
needs a net route to LAN B
through the Linux router. The
Linux router on LAN B needs a
net route to LAN A via the LAN
A router.

Blass is a network
architect at Sprint Enter-
prise Services in Houston.
He can be reached at
dr.intranet@paranet.com.

Smart NICs preserve CPU cycles

BY JOE GERVAIS

The proliferation of Gigabit Ethernet networks and initiatives such as the Internet Engineering Task Force's IP Storage efforts are driving the need for a new network interface architecture. The doubling of processor performance every 18 months pales when compared with the tenfold increase in network speed every three years. With TCP/IP now the dominant protocol, what should this new network interface architecture be? Off-loading TCP processing from the CPU is certainly key.

Past off-load attempts have placed the entire TCP stack in a network interface card (NIC)-based processor. With a general-purpose processor on the NIC handling the TCP stack, this approach had coordination issues that became daunting as soon as a second adapter was installed into the same system.

A new way of addressing the TCP processing issue places data movement into specialized adapter hardware and leaves exception handling to host software. This parallels contemporary storage controller architecture. Such a methodology supports the hardware proponents' goal of allowing the system to off-load the CPU and memory-intensive data-movement tasks to hardware, while supporting software-only proponents by allowing software control over connection setup and tear-down, and error handling. Adapters using this technique improve host processor efficiency, increase data throughput and reduce latency.

To keep system CPUs from processing packet headers, adapters must perform this task. A typical TCP/IP stack's 20,000 lines of code is clearly more than can be handled efficiently by competitively priced NICs. Furthermore, at gigabit speeds, the TCP/IP stack is complicated enough to consume the fastest Pentium CPU available. To perform packet header processing on an inexpensive card, special network processing hardware that processes TCP/IP headers, rather than a general-purpose CPU, is needed.

To simplify the TCP/IP processing path, the host protocol stack does exception handling, including:

- TCP connection setup and tear-down.
- Retransmission.
- Reassembly of out-of-order segments.

In this method, only the processing of nonfragmented TCP connections is off-loaded to the adapter, a path through the TCP stack referred to as the fast path. With support for so many TCP code paths eliminated from the hardware stack, the benefits might be questioned.

According to W. Richard Stevens and Gary Wright in *TCP/IP Illustrated, Volume 2*, TCP operates in LANs without experiencing any exceptions between 97% and 100% of the time. As network, router and switch reliability improve, this number is likely to improve. Performance testing indicates that as much as 99.9% of TCP/IP data can be off-loaded to such an adapter. Additional testing

system/memory bus.

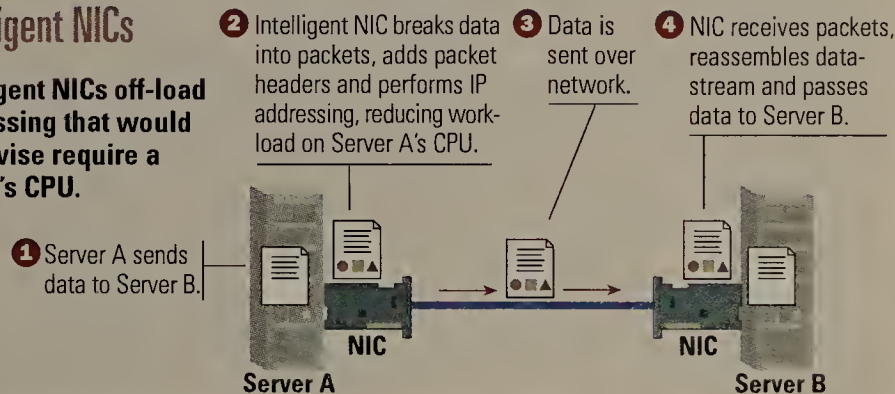
There is no header processing, little data copying and no checksumming required by the system CPU. Individual network packets are never moved into the CPU cache, allowing the system to keep important instructions and data resident. With the session data movement model and adapter acknowledgement processing, there are fewer PCI operations, and interrupts are reduced to as few as two interrupts per 64K-bit session read and one per 64K-bit session write.

A new generation of TCP off-load engines split TCP/IP processing between host-based exception handling and adapter-based hardware-assisted

HOW IT WORKS

Intelligent NICs

Intelligent NICs off-load
processing that would
otherwise require a
server's CPU.



has shown these server adapters can be hundreds of times more efficient than legacy NICs.

The main barrier to efficiently splitting TCP processing between an adapter and a host stack is coordinating the management of TCP state for each active connection. Here, a lightweight method of transferring context information is necessary to allow processing to transfer between the host stack and the hardware stack on the card.

With the adapter doing fast-path processing, the host interface manages data at the session layer. Rather than the host forming TCP segments and packetizing the segments into Ethernet frames, data movement is managed in much larger blocks at the session interface — independent of TCP window size and underlying media size. On receiving, session data — not packets — is moved directly from the adapter into the final memory destination, requiring just a single trip across the

data handling. The key to the technology is managing the migration of TCP connection context between the host and adapter. The technology is significantly more efficient than traditional network interfaces because the host is only managing session-level data rather than managing session and packet data. Systems with significant network traffic, such as file and back-up servers, will see marked improvement in overall system performance.

Gervais is director of product marketing at Alacritech in San Jose. He can be reached at joe@alacritech.com.

Got great ideas?

Network World is looking for great ideas for future Tech Updates. If you've got one, and want to contribute it to a future issue, contact Neal Weinberg, Features Editor (nweinberg@nww.com).



Gearhead . inside the network machine . Mark Gibbs

A STORM IN ANY PORT

Before we delve into the dark recesses of the network problems we began to experience last week, a few notes are in order.

A reader complained: "I think you did eEye a disservice with your comments. I know people who make a living doing security and penetration testing that use

nmapNT and are fond of it."

We don't think we did eEye a disservice in the earlier column, we simply reported what we found. Moreover, we have no more spare time to fool around with software than the average net manager does, and we felt we had made a valiant attempt to get it working.

Our reader goes on to ask if we installed the correct packet drivers (we think so, we followed the instructions), if we read the readme file (yes), and if we contacted eEye (we said we wanted to talk to them in the column).

We have since heard from the folks at eEye and will attempt to get nmapNT running ASAP — more later.

We mentioned in the last column that, "We just found that our NT server appears to have Back Orifice installed." It turns out that, according to the Super-scan utility (discussed in last week's column, www.nwfusion.com, DocFinder: 2132), our NT server has active ports on 12345 (the Win95/NT NetBus back door) and on 54320 (used by Back Orifice 2000). We tried many diagnostic utilities to check the system (such as BO Detect from CBSolutions: www.cbsoftsolutions.com/) but they all say neither Back Orifice nor NetBus is actually there.

We also find that we have lots of open ports, but we don't know what they are there for. This came as a complete surprise to us.

According to the SANS Institute's Intrusion Detection FAQ section on ports used by Trojan horse programs (www.sans.org/newlook/resources/IDFAQ/oddports.htm), we might have the Ultors Trojan (Port 1234), BackDoor-G, SubSeven or SubSeven Apocalypse (Port 1243), WinCrash (Port 4092) and, well, it's a long list that you need to cross-reference with other port lists (such as www.carton123.co.uk/Main_Info/port_2.htm). We are in deep shock.

On the other hand, we don't believe we could really be so compromised.

We are going to confer with our security gurus and the eEye folks, and we'll let you know what they determine.

One thing we noticed is the number of apparent hack attempts we're seeing since we have been running Attacker (another utility mentioned last week). We've been tested for NetBIOS connections and Back Orifice service four times from UUNET and three times from an Asian network in the past week. We'd be interested to know if you're monitoring for such activity on your network and if you are, how often you're seeing suspicious events.

The final blow from our reader was to suggest that admitting we had Back Orifice installed was not good for our credibility. We don't think it will hurt our credibility — such events happen to most of us mere mortals.

What network manager would be so foolish to say that his network is totally hack-proof and will remain so indefinitely? And the more experimental you are, the more vulnerable you will be, and Gearhead is in the Frankenstein world.

More next week as we unravel the mysteries of our server to see if there's a storm in any port.

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Editorial

Top security vendors rise to our debate challenge

It's enough to warm the cockles of my heart on this cold New England morning. A few weeks back, I challenged the five leading security software vendors to take part next month in a special presidential-style debate on the future of security at the ComNet 2001 Conference. All of them

— IBM, Computer Associates, Network Associates, Check Point and Symantec — jumped at the opportunity to participate in the Network World Security Showdown.

That's great news for you.

On one stage, you'll be able to hear the leading vendors as they field questions about their product portfolios and corporate strategies. Based on their answers to questions from

security experts, each other and the audience, you'll get a better understanding of the key threats to your network and how these providers are working to protect you.

As usual with our Showdown format, the vendors will not be allowed to give their canned marketing presentations. Instead, they'll have to think on their feet, providing answers to unscripted questions aimed at spotlighting the holes in their portfolios and how their approaches to security differ.

The security software providers are sending an impressive group. IBM is sending Bob Blakley, chief scientist, security, for IBM's Tivoli Systems company. Computer Associates is offering up Simon Perry, vice president of security, while Symantec is sending Steve Trilling, director of advanced concepts. Finally, Check Point is providing Greg Smith, group manager for product marketing, and Network Associates is giving us Jeff Jones, vice president of marketing for the PGP Security business unit.

All of these debaters will have to be ready to answer questions that range from technical to strategic. At least half the debate will involve vendors asking one another questions, and you can be sure these rivals will be quick to point out problems that their colleagues need to address.

The session, which will be held from 1:15 to 2:30 p.m., Jan. 30, at the Washington, D.C., Convention Center, is aimed at making it easier for you to choose a strategic security partner. Security is a paramount concern, and the array of products and different vendors makes it difficult to decide where to invest your dollars.

So mark your calendar for the Security Showdown, and send me your questions in advance. What do you want us to ask?

— John Gallant
Editorial director
jgallant@nwu.com

Message Queue

DISSATISFIED CUSTOMER

Ameritech's service problems did not start with the buyout by SBC Communications (www.nwfusion.com, DocFinder: 2133). They have had problems with service and meeting installation dates for two years. My firm is in the bank processing business, and we deal with about 50 phone companies nationwide. We monitor and maintain about 1,500 different circuits ranging from 9,600 baud to T-1 to many variations of frame relay. We know that there is a shortage of facilities; we know the regional Bell operating companies have declined in staff and are relying on new hires, and that some have outsourced their engineering. However, Ameritech is by far the worst of all the communication companies that our firm deals with. I would prefer to disconnect all our circuits and do business with a firm that at least acknowledges the \$55,000 in monthly business our company provides.

Larry Sanderson

Vice president of telecommunications
Computer Services, Inc.
Paducah, Ky.

ANOTHER CONTENDER

I just read your feature on Web hosts (www.nwfusion.com, DocFinder: 2134) and was surprised to see that NaviSite was not mentioned. My firm, an online community for senior citizens, actually began hosting with Exodus but switched to NaviSite earlier this year as our membership began to grow.

NaviSite's experience and track record over Exodus in providing comprehensive managed services was very important as was the fact that we could lease software and hardware from them rather than buy it. The clincher was NaviSite's service-level agreements, which were more clearly defined than those offered by Exodus and others. We're very happy we made the switch.

K.C. Choi

Chief technology officer
Senior.com
Irvine, Calif.

Send letters to nwnews@nwu.com or John Dix, editor in chief, Network World, 118 Turnpike Road, Southborough, MA 01772. Please include phone number and address for verification.

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MORE ONLINE

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CLEC CATCH-22

Regarding the article "Caution flags flying as CLEC woes mount" (www.nwfusion.com, DocFinder: 2135):

Competitive local exchange carriers are forced to use the incumbent local exchange carriers' local loops for the last mile because it isn't economically feasible to install a new loop until you have a large customer base. But the CLECs have a difficult time building a large customer base when they are dependent on the very ILEC they're competing against. This is the Catch-22 the ILECs perpetuate because it means that they must weather a short competitive flurry, then take over an environment without competition once again.

If the consumers of telco services don't petition the Federal Communications Commission to find a way to open the local loop to competition, there soon will be none.

Stephen Wyman

Network specialist

Texas Department of Transportation
Austin, Texas

THE NAME GAME

I would like to congratulate Daniel Briere and Beth Gage on a fine attempt at ridiculing the poor name choices of high-tech corporations (www.nwfusion.com, DocFinder: 2136). I would also like to provide the following clarifications:

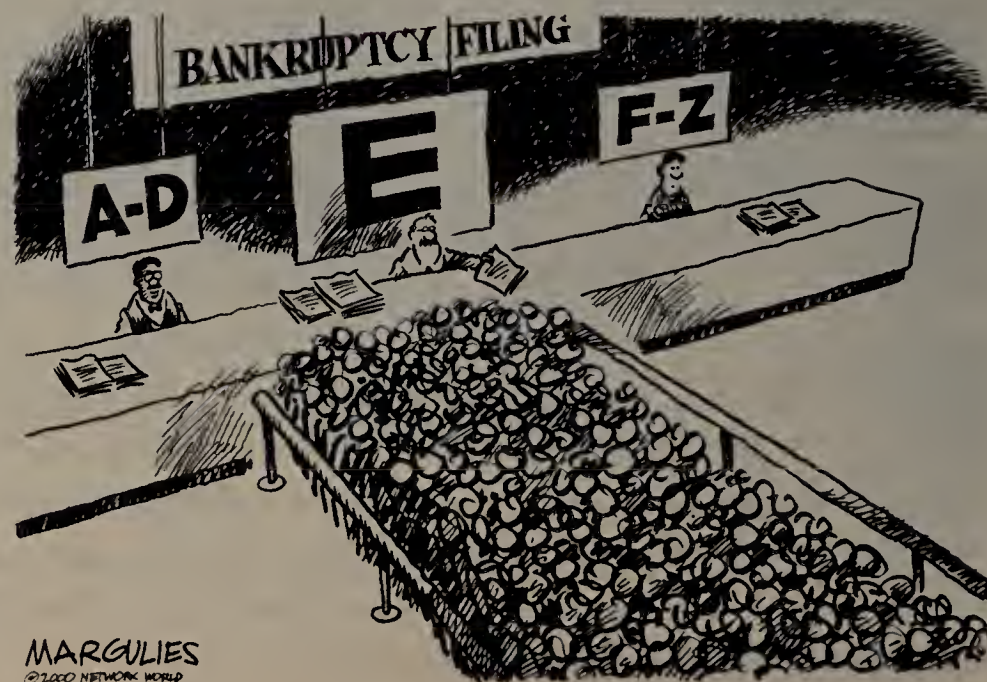
I worked at Broadwing during the great name change of 1999. The Broadwing is a type of hawk, and the favorite predatory bird of CEO Rick Ellenberger, or so the explanation went at the time.

Gnutella is named after Nutella, the incredibly popular (worldwide) hazelnut and cocoa-based spread made by the Ferrero Group. If you have never had Nutella, you are missing out on one of the great pleasures in life.

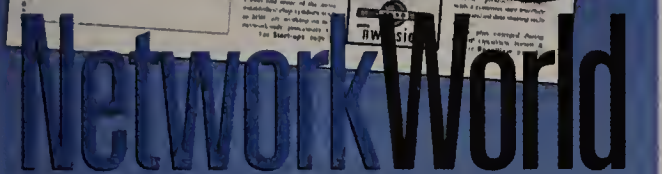
Unfortunately, following Briere and Gage's diatribe to its logical conclusion, the names of most high-tech corporations are over the top, overused or just annoying — even the ones that make sense.

Robert Johnson

Director of Technology
Advent Networks
Austin, Texas



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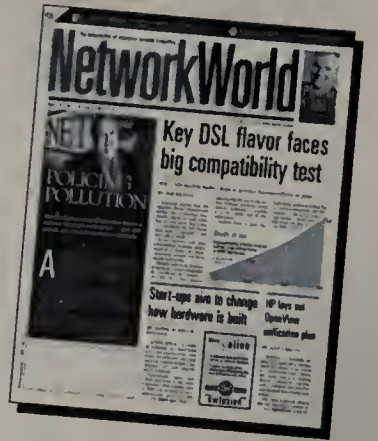
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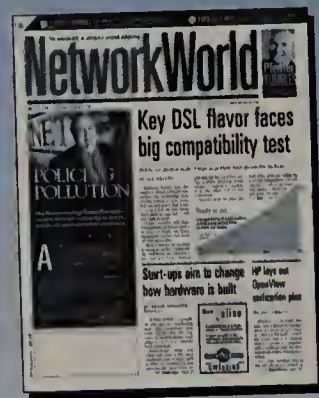
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THOSE NOT ON THE BLEEDING EDGE STILL NEED SUPPORT

At a recent dinner with engineers from the most popular network equipment manufacturers, I got an earful about how engineering and marketing departments are deepening the Digital Divide with their new equipment — equipment that ignores the needs of existing infrastructure.

For example, Nokia makes a fine voice-over-IP gateway that you could use to roll out new voice services in a central office. But the slowest interface it supports is a DS-3 (equivalent to 28 DS-1 lines, or 672 phone lines). So parts of the world where most lines are carried on DS-1, T-1 or even analog lines aren't going to make use of this new gear. This isn't rural America we're talking about — it's a common situation in many small cities. New equipment coming out does not address existing infrastructure.

Why? Because no one wants to work on prosaic tried-and-true technologies; everything has to be hot, fast, sexy and new. The engineers don't want to build 10/100 Ethernet interfaces; they want to

play with Gigabit Ethernet. The marketing people don't want to sell the old stuff because it's inexpensive, has low margins and doesn't make them seem high-end. If you're looking for venture capital for a start-up, don't dare talk about anything but optical — copper is for your father's network.

Nokia is just one example. Juniper Networks didn't make copper interfaces for its gear until recently. Cisco just started shipping a 100M bit/sec copper interface for its GSR routers last month.

You don't have to go to high-end gear to see this syndrome. Want a dozen analog dial-up lines for remote access? Good luck.

The remote access server market is focusing on T-1 Primary Rate Interface service at the low end, and finding name-brand gear that will talk to analog lines means going to the used market or giving up features.

Have a Cisco 2500, the best-selling router of all time, with literally millions of units out in the field? Hope you like the feature set you have now, because IOS code bloat means you're not going to be able to

fit new software on that old platform.

What can you do? Start by giving immediate feedback to your vendors. Let them know you don't want to be left behind — and your IT budget isn't going to let you upgrade everyone to Gigabit Ethernet just to use its new stuff.

You also need to be realistic. It's not sufficient to stamp your feet and insist that your vendors support 10M bit/sec Ethernet or token ring forever. But if you inventory your network so you know where the latest and greatest won't work, that solid data will help vendors take you seriously. Take that kind of inside information not only to your favorite sales contact, but also up the chain. Anyone with an engineering management hat will want to know what customers really need and what is really out in the field.

Snyder, a Network World Global Test Alliance partner, is a senior partner at Opus One in Tucson, Ariz. He can be reached at Joel.Snyder@opus1.com.

USERS' UNPLUGGED VISIONS MAKE WIRELESS STRATEGY A MUST

A World War I era song asked the timeless question: "How're you gonna keep 'em down on the farm after they've seen Par-ee?" Today, those lyrics can be applied to users who have seen the excitement of a wireless world and now dread being wired to a desk.

Anyone who watched CNN or read a newspaper during Comdex week saw headlines about new wireless devices that give "instant access" to e-mail and

the Internet, "push-of-a-button" access to corporate networks and "anytime, anywhere" access to enterprise applications. Whether you're ready or not, your users are going to start clamoring for these sexy, new devices.

They'll want access to all those juicy applications wireless vendors have promised to make available.

Like the early days of PCs, business people will find a way to bring wireless LANs, WANs, PDAs, phones and Internet access devices into the office. They aren't going to wait for the IT department to evaluate them and set corporate standards and guidelines. Some of these wireless units are so inexpensive that they aren't even a blip in the budget. But without a sensible strategy, these new toys can be more than a blip to your IT infrastructure and support plan.

The biggest favor you can do for your user base — and yourself — is to properly set expectations. Every PC user who sees a commercial for a wireless product thinks he will be able to turn on this miracle device, push a button to access his usual e-mail

account, and send and receive messages (including large attachments), no matter where in the country — or the world — he happens to be.

Right. And I'm selling prime real estate in Orlando for just \$100 per acre.

This is your opportunity to educate the masses. Help them understand fact from fiction . . . or at least hype. While I'm not suggesting that vendors would lie about their products' and services' capabilities, they tend to speak only about peak performance and not about what's real.

For example, many wireless phone service companies are touting their Wireless Application Protocol-enabled Internet access phones. The ads show people in airports, at restaurants, wherever, making stock trades, checking entertainment schedules, looking up flight information and so on. What the ads don't point out is that service is not universally available, continentally or globally, and it's not very fast. What's more, few Web sites have been developed for optimized access via wireless phones. You can have some frustrated users running up some hefty phone bills just trying to get information they expect to get to easily.

Next we have all the Bluetooth devices that are primed to hit the market in the coming year. Dataquest estimates that Bluetooth wireless technology will be in 30 million devices by the end of 2001. Cahners In-Stat Group predicts 670 million devices will be Bluetooth-enabled by 2005. If that's the case, expect a few of them to pop up in and around your office soon.

Who do you think will be asked to install and support them?

Bluetooth technology, which relies on radio signals

operating optimally in the 30-foot range, looks pretty interesting for office uses such as connecting PCs to peripherals. But it may cause you headaches if your organization has also decided to adopt the IEEE 802.11b standard for wireless LANs. Both operate in the same frequency, and devices can easily conflict, causing intermittent or unreliable transmissions — as well as dropped connections, lost data and general user dissatisfaction.

It gets even worse if you introduce wireless phones operating in the same frequency range. My office has such a phone system, and when someone with a phone walks near a hub for the wireless LAN, both units go berserk.

If you haven't done so already, it's time to develop your company's wireless strategy and develop guidelines for users.

Start testing every device and service that looks promising. Test for conflicts among devices. Set your standards and inform employees of which products you will support. Make sure they understand the performance capabilities and limitations.

Wireless technology is evolving rapidly, so you'll need to continue to reevaluate your strategy and chosen products and services.

The players will change rapidly too, and it will be years before we see clear winners emerging in this market space. But the potential for wireless applications is enormous, and it will be worth the time and effort spent studying, testing and deploying your options.

Musth ler is vice president of Currid & Company, a Houston technology assessment firm. She can be reached at linda@currid.com.



VIRTUAL PRIVATE VIA BLIND PRODUCTS

**Vendor consolidation,
better price/perfor-
mance and new
enterprise features
mean good things for
your network.**

BY JOEL SNYDER

The VPN market is hot. Driven by fear of hackers and the economics of the Internet, VPNs — which create encrypted data tunnels through the 'Net — are becoming almost commonplace. Every network manager should be thinking about how to fit them into their short- and long-term strategies.

Five trends dominated the VPN market this year: consolidation of major players; an introduction of high-performance products at lower prices; validation in the high-end enterprise market; heavy adoption of low-end products; and the lack of excitement over Windows 2000.

For 2001, there is an even rosier view for corporate network managers looking at buying and using VPN technology. With their favorite vendors finally getting serious about VPN hardware and software, the spectrum of possibilities has become broad enough to make even the most conservative network architect comfortable.

The promise of IP Security's (IPSec) standards is also coming to fruition. Although the Holy Grail of all standards — multivendor interoperability — is still touchy, interoperability problems surrounding IPSec are more the exception than the rule now.

Consolidation that creates value

There are as many VPN players today as there were a year ago, but things have shifted considerably. Once dominated by dozens of small companies competing in the VPN hardware arena, the scope of the VPN market now has an expanded spectrum of products. Those include carrier-class hardware, network-based providers, managed services, conversion and compatibility service vendors, and super low-end VPN hardware and software products.

The heavy hitters in the network business have made their VPN moves. Cisco acquired Compatible Systems and Altiga, and has begun to push Altiga-based products hard to its customer base. At the same time, 3Com exited the enterprise VPN marketplace. Its outstanding Pathbuilder product line, which had excellent VPN performance, has fallen through the cracks in 3Com's on-again, off-again corporate network strategy. Still, 3Com intro-

duced a crypto-accelerated network interface card, showing that it's not so uninformed as to completely leave VPN technology out of its product mix.

In addition, Timestep was gobbled up, first by Newbridge Networks, and then by Alcatel. Similarly, Network Alchemy became a Nokia subsidiary, while Indus River became part of the Cabletron spinoff Enterasys.

This continuing consolidation opened space for a variety of players at other levels of the VPN marketplace. For example, Cosine Communications, a manufacturer of carrier-class hardware, burst onto the scene with its VPN products, challenging Nortel Networks for the potentially lucrative carrier market.

Network managers should view this consolidation with caution, however. When buying VPN hardware and software, be absolutely sure the product offers total IPSec compatibility. Your vendor should be participating in the various industry

NetworkWorld

BUYER'S

VPNs

GUIDE

Feature:

VPN market trends.

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A look at high availability VPN features from seven vendors.

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- Interactive Buyer's Guide chart.
- VPN service customers tell their stories.

THE NETWORKS: TRENDS NOW

VPN bakeoffs, and hold VPN Consortium membership or International Computer Security Association certification, as all offer some proof of interoperability.

An important result of all this motion in the VPN marketplace is the scaling of the "Intel wall," a barrier present in standard PCI-based computing systems that has effectively limited CPU-based encryption to about 6M bit/sec. The general trend of the computer industry — faster and cheaper — has also been present in the VPN market. Vendors such as Chrysalis, RedCreek Communications and IRE, which have pushed high-end VPN acceleration products in the \$5,000 range, are seeing tremendous competition as hardware-based VPNs become cheap and commonplace. Vendors such as Nokia, NetScreen Technologies, Alcatel and Radguard are offering complete VPN systems with 50M bit/sec to 100M bit/sec encryption throughput for about \$10,000. In general, the price for high-speed encryption at near 100M bit/sec speeds has dropped by approximately 50% in the past 18 months.

Network managers are already accustomed to budgeting for equipment in January that costs less in July. VPN equipment will follow the same trend. The biggest sweet spot for budgets is going to be in the greater-than-100M bit/sec market, in which products at 100M bit/sec to 1G bit/sec will continue to drop amid increased competition.

Ready for companies

Enterprise-level features, such as

high availability and client deployment tools, are now readily available with VPN product offerings.

As recently as last week RedCreek teamed with Cyber IQ Systems to announce a high-availability VPN package called the ReD i-Cluster that ties together two RedCreek Ravlin 7160 VPN gateways using Cyber IQ HyperFlow3 clustering and load-balancing product.

In terms of high availability, vendors had only limited support for master/slave VPN servers in mid-1999. Now enterprise managers have no less than four load-balancing/high-availability VPN products available from Rainfinity, Foundry Networks, Stonesoft and Nokia. In addition, as our testing demonstrated (see story, page 76), Radguard, NetScreen and Alcatel (Timestep) also make reliable and network-ready high-availability VPN devices that will help bring VPNs out of the lab and into production networks.

Another important corporate feature is client deployment tools for remote-access VPN configurations. Although we didn't see a lot of new products in 2000, the market was still busily absorbing those introduced in 1999, including Intel's (Shiva) remote-access client deployment tool, a new version of IRE's SafeNet client and deployment tool, and the latest version of Indus River's RiverWorks IPSec client and remote-user management tool.

At the same time, most products are lacking in enterprise management for large and meshed VPN networks, and we didn't see new products this year that addressed this problem. Some ven-

dors, such as VPNet, have had this capability for some time. However, corporate management is missing from most products, and we'll be looking for this as a key feature for VPN vendors (new and old) to introduce in 2001 to keep VPNs in sync with the rest of the network.

Network managers who have been waiting for better management features will see some progress, but there's still a long way to go before VPN products will be fully integrated into enterprise networks. Be prepared for higher-than-average management and operations costs for a few years.

Pervasive VPN technology

Because VPN technology has moved from "magic" to "mundane" this year, more products at the low end are being introduced and refined. For example, small office/home office firewall devices for DSL and cable modem users are now commonly available with VPN features. Vendors such as SonicWall, NetScreen and WatchGuard have pushed hard to bring VPNs to this marketplace at reasonable costs.

This isn't limited to firewalls. Most routers now include some IPSec VPN features, and the open source community is working to get IPSec into free-ware and commercial Unix implementations. FreeS/WAN and KAME, two open source IPSec implementations, are available on multiple platforms and have made important stability and compatibility strides this past year.

Network managers may be inundated with IPSec possibilities, but the danger is always in the management side. Getting it to work is now possi-

ble, but fitting it into the enterprise infrastructure is no easier than in recent history. IPSec standards writers are beginning to work on simplifying VPN management, but the results are still a few years out.

Windows 2000 fails to excite

The last 2000 trend is the lack of enthusiasm over Win 2000's built-in IPSec VPN capabilities, particularly for clients. The abrupt collapse of the third-party TCP/IP stack market when Microsoft announced Windows 95 has not been repeated. Third-party VPN clients from leading vendors such as Nortel and Check Point have continued to go strong with heavy customer demand. VPN hardware manufacturers are working to ensure their client software will work on Win 2000, and OEM client vendor IRE/SafeNet shipped its Win 2000 client to an enthusiastic customer base at mid-year. But network managers watching Win 2000 carefully should keep third-party VPN clients on their radar screens as they evaluate and deploy Win 2000 to desktops and laptops.

These five trends are pushing the VPN market forward. While network managers have to be cautious about management issues and vendor consolidation, higher performance for lower prices as well as a spectrum of new products mean VPNs will be easier, faster and cheaper in 2001.

Snyder is a senior partner at Opus One, in Tucson, Ariz., specializing in messaging and security products. He can be reached at joel.snyder@opus1.com.

Pure hardware VPNs Rule high-availability tests

**Nokia tops the lot in reliability
and load-balancing
performance.**

BY JOEL SNYDER AND CHRIS ELLIOTT, NETWORK WORLD GLOBAL TEST ALLIANCE MEMBERS

High availability means never having to say, "I'm sorry, but the network is down."

As VPNs make their way into corporate networks, high-availability VPN hardware and software is slowly becoming available. Our torture tests show that while a number of high-availability VPN products are on the market, few really meet the needs of enterprise and application service provider data centers.

Standing alone as a survivor of our rigorous test bed is Nokia's CryptoCluster 2500, offering the most amazing high-availability and load-balancing feature set we saw, thereby earning it the *Network World* World Class Award. With subsecond failover and active load balancing, CryptoCluster came closer to high-availability nirvana than any of the other six products we tested. When it came to pure VPN performance in a high-reliability, high-bandwidth environment, Nokia left everyone else in the dust.

Next in line was NetScreen



Technologies' NetScreen-100. While it couldn't match Nokia's reliability statistics and active load-balancing performance, it brought something else to the table: a stateful firewall. For network managers who want to combine their VPNs and firewalls into a single box, NetScreen's 1.75 inch-high NetScreen-100 is an excellent choice.

Radguard, a *Network World* Blue Ribbon winner in our last VPN showdown, did well in our tests with its cIPro 5000, but was held back only slightly by a slower reaction time at high loads and the failure of an

important failover test. Alcatel (you may know it better as Timestep, which was bought by Newbridge Networks, which was then bought by Alcatel), another Blue Ribbon winner in years past, also looked great in our tests with its Alcatel 7137 SVG — until the load got high, at which point we found some instabilities in its failover code.

Products from Rainfinity, Stonesoft and Foundry did well in many of our tests, but we wished for the simplicity and reliability of Nokia's CryptoCluster 2500 as we analyzed the competition.

Alcatel, Nokia, Radguard and NetScreen sent us pure hardware VPN products, which gave us high-availability and high-performance VPNs in a tiny package. Nokia's CryptoCluster 2500, Radguard's cIPro 5000, Alcatel's 7137 SVG and NetScreen's NetScreen-100 all showed up as small (1.75 inches high) packages with crypto power to burn. We didn't test specifically for cryptography performance, but our high-availability tests ran up to 40M bit/sec of encryption, and none of these boxes broke a sweat supporting that.

Three companies came in with high-availability products based on Check Point's FireWall-1/VPN-1 software product line. Check Point prefers to provide high-availability VPN packages with its partners, and worked with Rainfinity, Stonesoft and Foundry to set us up with combination hardware/software or software/software bundles for this test.

Although Check Point sells an OEM cryptography accelerator board from Chrysalis called the Luna VPN, we did not receive an accelerator to use in the test from any of the participating Check Point partners. This limited the speed we could test the failover/high-availability features in Check Point-based products to between 6M bit/sec and 8M bit/sec, which are the practical limits for nonaccelerated cryptography with Intel or scalable processor architecture (SPARC) platforms and VPN-1 software.

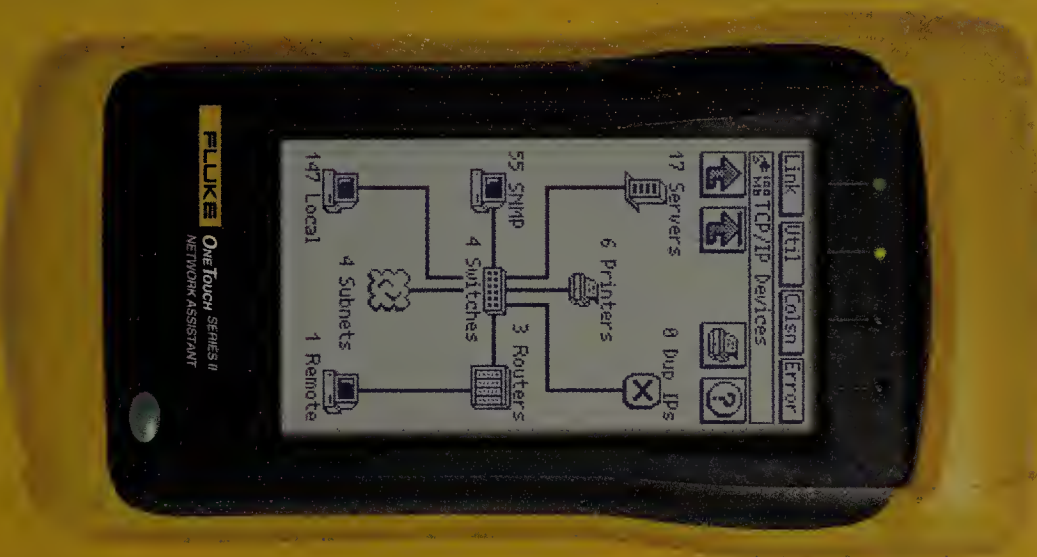
Rainfinity's RainWall 1.5 and Stonesoft's StoneBeat FullCluster 2.0 are software-based products that sit on the same system as the Check Point VPN-1 software and manage load balancing and high availability. Foundry sent two of its ServerIron XL systems (running Version 7.1 of its operating system), which form a high-availability sandwich around the Check Point VPN-1 systems.

We believe that Rainfinity, Stonesoft and Foundry started out from a weaker position because of the number and cost of the components in their configurations. The recommended Sun E450 server with two 450-MHz CPUs aren't cheap (list price is more than \$40,000 for each, and you need two of them), plus the Check Point FireWall-1/VPN-1 license (typically \$10,000, and you also need two of them) and VPN accelerator card (list price is about \$4,000, and you need two) all add up. You're at

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more than \$100,000 before you even add Rainfinity, Stonesoft or Foundry components, which add between \$12,000 and \$16,000, into the mix.

However, Check Point's dominance of the firewall and VPN industry (it claims to have 52% of the VPN market) means that many companies may be adding high availability to an existing firewall or VPN environment in which many of these costs are already sunk. Large companies that have standardized on the Check Point management style may also regard price differences as small change in the big picture. If the power, reliability and expandability of the Sun E450 server isn't required in your network, an Intel server with Windows NT and two CPUs would be about one-tenth of the price of the Sun SPARC system.

What is a high-availability VPN?

As we analyzed the products in our lab, we discovered that anyone building a high-availability VPN is going to make some serious compromises. No single product has the complete answer, and no two vendors looked at building high-availability VPNs in the same way. We also discovered that high availability is often combined with load-balancing features, sometimes intentionally and sometimes as an afterthought.

Our definition of a high-availability VPN assumed that the main goal was reliability in the face of component failure.

Component failure is different from data center failure. What happens if the entire computer room goes dark? In that case, a whole different kind of high-availability is needed.

We didn't test these features, but several vendors (including Radguard and some of the Check Point-based vendors) offer high-availability options for environments in which multiple data centers are involved. In Radguard's case, its high-availability option does not differentiate between collocated and distant VPN gateways. For everyone else, distant VPN gateways (called "multiple entry points" in Check Point's vocabulary) require a different configuration.

The mixture of high availability and load balancing is common, but the kinds of load sharing differ among vendors. One reason load

sharing is desirable in a high-availability situation is that it reduces the total amount of load that has to be flopped from one gateway to another in the case of system failure. This was particularly visible in the Nokia product, in which sub-second failover was facilitated by the fact that only half the load had

to be "failed" whenever we created a problem.

Load sharing is advertised as a benefit of the Check Point partners, but none of them did it well. Our intent was not to specifically test load sharing, but we created heavy loads using 400 IPSec Security Associations with evenly distributed traffic. We expected

that any product that advertises load sharing would pass this traffic among the high-availability nodes. What we observed, however, was that little or no load sharing occurred with the Stonesoft, Rainfinity or Foundry products.

There are three possible explanations for this. One is that

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NetResults

CryptoCluster 2500

RATING: 9 **COMPANY:** Nokia, 1538 Pacific Ave., Santa Cruz, Calif., www.nokia.com/s_spec_2500.htm
COST: \$19,990 (\$9,995 each for two CryptoCluster 2500s) **PROS:** Subsecond failover; high performance; good form factor; load-balancing support. **CONS:** No firewall included.



Alcatel 7137 SVG

RATING: 7.3 **COMPANY:** Alcatel, 54 Rue La Boétie, 75008, Paris, France, www.alcatel.com/ **COST:** \$21,990 (\$10,995 for each Alcatel 7137 SVG) **PROS:** High-performance crypto; good form factor; excellent certification authority compatibility. **CONS:** Slow/unreliable failover at high speeds; high availability not very manageable; low performance for public-key operations.

ServerIron XL

RATING: 6.4 **COMPANY:** Foundry Networks, 2100 Gold Street, P.O. Box 649100, San Jose, www.foundrynet.com/products/Webswitches.html **COST:** \$115,990 (\$7,995 each for two ServerIronXL 8-port switches, \$80,000 for two Sun E450s, \$20,000 for two copies of Check Point HA-VPN-1) **PROS:** Good performance; load balancing supported; includes Check Point firewall. **CONS:** Not standards-compliant; many components reduce total reliability and increase management cost; poor price/performance.

NetScreen-100

RATING: 7.5 **COMPANY:** NetScreen Technologies, 2860 San Tomas Expressway, Santa Clara, Calif., www2.netscreen.com/pub/ **COST:** \$19,990 (\$9,995 each for two NetScreen-100s) **PROS:** High performance; good form factor; good firewall included. **CONS:** High-availability features very new; no fallback capability; management not yet integrated into graphical user interface.

RainWall 1.5

RATING: 7.3 **COMPANY:** Rainfinity, 2740 Zanker Road Suite 200, San Jose, www.rainfinity.com/products/index.shtml **COST:** \$112,000 (\$12,000 for RainWall-E, \$80,000 for two Sun E450s, \$20,000 for two copies of Check Point HA-VPN-1) **PROS:** Good performance; load balancing supported; includes Check Point firewall. **CONS:** Not standards-compliant; lots of components may reduce total reliability and increase management cost; poor price/performance.

StoneBeat FullCluster 2.0

RATING: 7.4 **COMPANY:** Stonesoft, 115 Perimeter Center Place South Terraces, Suite 1000, Atlanta, www.stonesoft.com/products/ **COST:** \$113,900 (\$13,900 for StoneBeat FullCluster, \$80,000 for two Sun E450s, \$20,000 for two copies of Check Point HA-VPN-1) **PROS:** Excellent high availability management; test subsystem very flexible; includes Check Point firewall. **CONS:** Not standards-compliant; lots of components may reduce total reliability and increase management cost; poor price/performance.

clPro 5000

RATING: 7 **COMPANY:** Radguard, 4 Preston Court, Suite 204, Bedford, Mass., www.radguard.com/html/clProVPN.html **COST:** \$18,850 (\$5,950 for CA; \$6,450 each for two clPro 5000s) **PROS:** Moderate performance; good form factor; firewall included. **CONS:** Slow failover; management needs work; high-availability status information unavailable.

	Failover speed 30%	Failover reliability 30%	System reliability 20%	VPN features 10%	High-availability management 10%	Total score
Nokia	10	10	8	7	7	9
NetScreen	7	8	8	7	7	7.5
Stonesoft	7	9	5	7	9	7.4
Alcatel	6	8	8	8	7	7.3
Rainfinity	8	8	5	7	8	7.3
Radguard	5	8	8	8	7	7
Foundry	5	8	5	7	8	6.4

SCORING KEY

10 – Can't be better; 9-8 – Excellent; 7 – Very good; 6-5 – Average; 4-2 – Needs improvement; 1 – Not supported or doesn't work.



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although our load was high from a CPU point of view (because we were pegging the systems trying to

son not to balance traffic at the Security Association level. For high-traffic, site-to-site VPNs, this kind of load balancing would be required for an effective system.

The third possibility is the load balancers don't work correctly. Because we didn't focus on load balancing in this review, we didn't quiz all the vendors on this result. However, if you care about load balancing, you should look carefully at how the load balancing works — whether at the IP address level, or with a finer grain, at the IP Sec level.

One surprise was the lack of high-availability hardware features. We found dual power supplies and some hot-swap capabilities in the Sun E450 servers that went along with products from Rainfinity, Stonesoft and Foundry. Foundry's ServerIron XL can be equipped with optional redundant power supplies but wasn't for our tests. Generally the hardware stands by itself. One reason for this may have been the reliability of today's systems. We popped the tops on the boxes from Nokia, NetScreen, Radguard and Alcatel and discovered similar hardware designs: little or no bus traffic, few connectors, cool-running components (that need little or no cooling) and low component counts. Several participants told us they didn't feel the need for extra hardware, citing reduced reliability that

accompanies additional complexity. However, simple changes such as multiple power cords could guard against common human errors. NetScreen offered to send us a pair of its \$110,000, Gigabit-capable VPN systems with a bevy of high-reliability hardware features, but we wanted to compare similar systems.

How fast and well does it work?

Our test lab was designed to answer how well does high availability work? The answer, with one exception, is "not terribly well."

By the time we finished testing, we found flaws in virtually every product we tested. There was a clear winner in Nokia's CryptoCluster 2500, which passed all of our high availability tests and also outperformed the nearest competition by a factor of 10 to 1.

However, Nokia has its own problems as the CryptoCluster doesn't do a lick of firewall functions, and customers we talked to were uncertain about how Nokia plans to integrate its Check Point-oriented IPSO firewall and VPN products with the CryptoCluster line.

Still, when it comes to high availability, Nokia beat the competition into the ground with astonishingly and unbelievably good perfor-

mance. When one of the participants in this review asked us, "What would it take to be No. 1 in this review?" our answer was "sub-second failover." Nokia's CryptoCluster 2500 does it in less than 1 second even at encryption loads up to 40M bit/sec.

Our simplest tests were the link failure and power failure tests: Someone unplugs a patch cord or power cable. Because link failure causes a detectable change, it's easy to send a message to the other cluster member (on the still working interface) to say, "I'm broken." The same is true for power failure: The other guy just goes dead. All the products we looked at passed these tests easily. After the 0.2% loss of packets from Nokia's CryptoCluster 2500 on those tests, Alcatel's 7137 SVG and Stonesoft's

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Nokia's CryptoCluster 2500

earns our top honor for enterprise-level VPN high availability support due to its sub-second failover performance and its active load-balancing features.



get all the encryption done), it wasn't high from a traffic point of view, and so load balancing didn't come into play — after all, a few megabits of traffic through a huge Sun server isn't worth balancing if you're just a firewall.

A second possibility is that the particular traffic profile we used was not amenable to load balancing. If load balancing was based on the addresses of the two gateways, and not on the number of Security Associations between them, then a load balancer would not have seen our traffic as "balanceable" because we used only a single virtual gateway to create the load. This is perhaps a reasonable assumption on the part of the load balancers (because our traffic profile was slightly atypical), but there's no rea-

hardware features. We found dual power supplies and some hot-swap capabilities in the Sun E450 servers that went along with products from Rainfinity, Stonesoft and Foundry. Foundry's ServerIron XL can be equipped with optional redundant power supplies but wasn't for our tests. Generally the hardware stands by itself. One reason for this may have been the reliability of today's systems. We popped the tops on the boxes from Nokia, NetScreen, Radguard and Alcatel and discovered similar hardware designs: little or no bus traffic, few connectors, cool-running components (that need little or no cooling) and low component counts. Several participants told us they didn't feel the need for extra hardware, citing reduced reliability that

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| • Harvardnet | • SonicWall |
| • Indus River/Enterasys | • Trustworks Systems |
| • InfoExpress | • VPNet |
| • Lasat Networks | • WatchGuard |
| • Mobile Logic | |

How we did it

We used equipment from Spirent Communications and Extreme Networks to build a test bed for high-availability testing. Spirent's SmartBits traffic generators were used to generate traffic that would cause our IP Security test device to establish 400 IPSec Security Associations. The traffic flowed from the SmartBits over an Extreme Summit 48 Fast Ethernet switch to an IPSec tester. From there, we went through another Extreme Summit 48 switch to a 100M bit/sec LANtronix hub, which was the common point of connection for all nodes in the high-availability cluster, then to another hub, another Extreme switch, and finally to the SmartBits on the other end.

Once we got 400 IPSec Security Associations established, we ran tests against each VPN device pair at load levels of 1M bit/sec, 10M bit/sec, 20M bit/sec and 40M bit/sec. Each test ran for 100 seconds. At 10 seconds into the test, we caused some high-availability event to occur, such as unplug-

ging a patch cable or turning off one of the boxes. We measured the total amount of lost traffic. If a cluster failed to recover during the 90 seconds we gave it, we considered it a failure.

In any case in which the system failed, we did a complete reboot and re-established the 400 IPSec Security Associations before trying the next test. For systems without hardware accelerators (Rainfinity, Stonesoft and Foundry), we only reported numbers at 1M bit/sec and 6M bit/sec (rather than 10M bit/sec) because the systems could not keep up at speeds higher than that.

Our failover tests fell into four categories. Link failure tests were designed to simulate the most common network failure: a bad patch cable or connection. We ran link failure tests on the inside and the outside interfaces. Power failure tests, the second category, simulated a system crash, halt or shutdown. In the case of the Solaris-based systems, we didn't dare to repeatedly pull the power plugs out of the wall, so we simulated this by

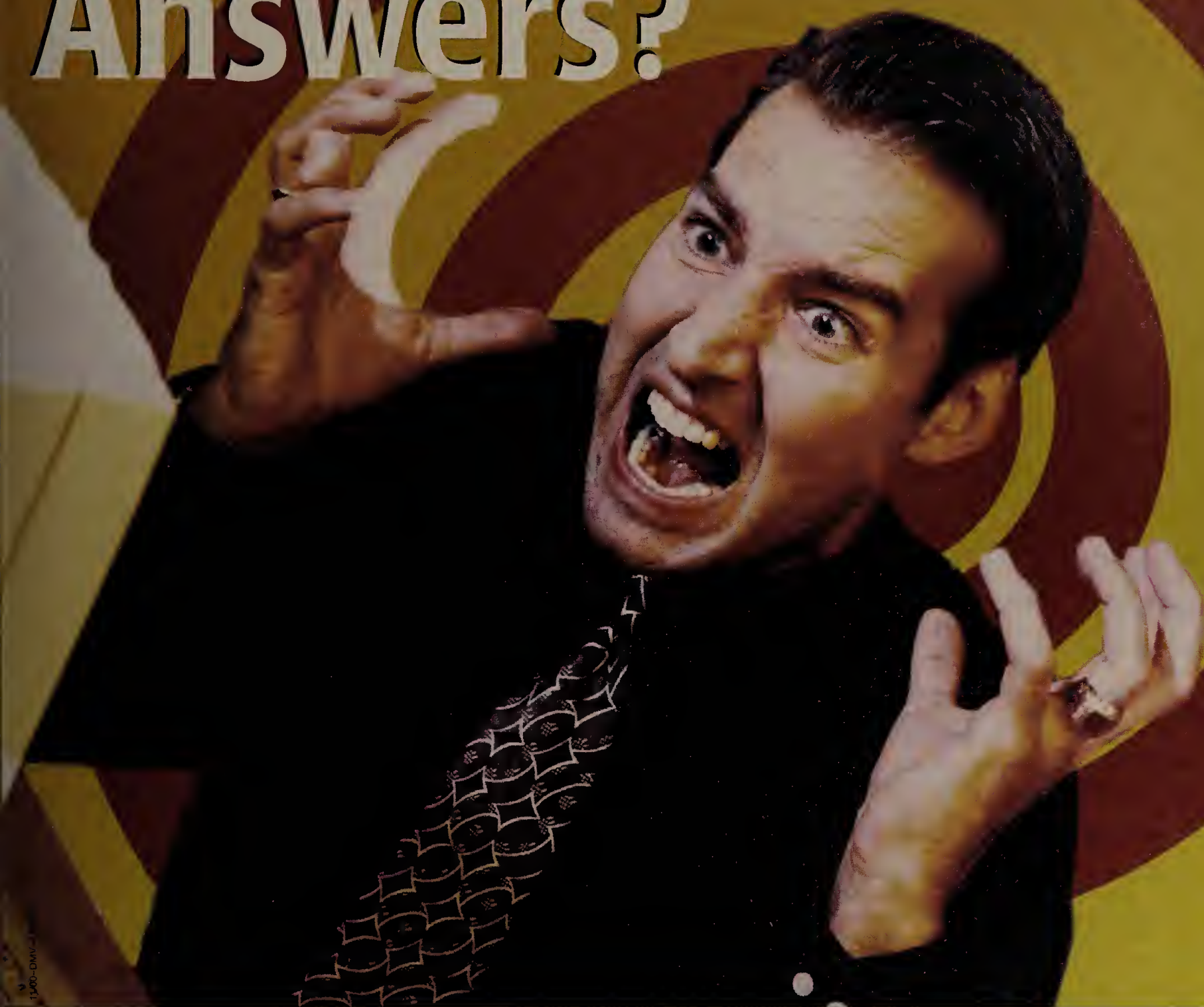
simultaneously disconnecting all the patch cables from the "failing" system and then going through normal system shutdown on the isolated system. This was important for failback tests, the third category, which attempted to measure how quickly a reinitialized high-availability system would rejoin the cluster and be ready for the next event.

Connectivity failure tests comprise the fourth test category. These tests simulated a more complex kind of failure in which the systems are able to communicate with each other, but some other kind of connectivity is lost, such as swapped patch cables or a failing or suddenly misconfigured switch fabric.

After running all the tests, we averaged and reported the lost traffic percentages across each category at each bandwidth.

For tests in which the product failed outright, we did not include the infinite failure time in the average but did note the failure in our overall results. ■

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StoneBeat FullCluster 2.0 lost between 5% and 7%, while most of the other products were in the 8% to 10% range. The slowest to recover was Foundry's ServerIron XL, with a 13% loss.

Our connectivity test was one of the toughest tests we conducted for high availability. We simulated a total of three failures other than the obvious, and only Nokia's CryptoCluster 2500, NetScreen's NetScreen-100 and Stonesoft's StoneBeat FullCluster 2.0 could handle them all. For example, we looked at what happens if the cables of one of the systems was swapped, perhaps by a misprogrammed or failing LAN switch. Failover for CryptoCluster 2500 was still less than 1% packet loss, while the NetScreen-100 and the StoneBeat FullCluster 2.0 lost 14% and 16%, respectively.

Of the three products that passed all connectivity tests, StoneBeat FullCluster 2.0 deserves special mention because of its "Test Subsystem." The product includes a test script system that network managers can use to devise their own rules for what constitutes a failure. We were disappointed that the default set of scripts couldn't detect connectivity failures — even though the tools Stonesoft provides let you easily detect that kind of failure. Only StoneBeat FullCluster 2.0 gives you the tools to build a really elaborate failure detection system, but a poorly chosen set of defaults and documentation advice makes network managers work harder than they should have to.

Although the NetScreen-100 handled the connectivity failure tests admirably, it failed one place in which no other product did: the failback test. In the failback test, we looked at how well a system that had a high-availability failure (such as a system reboot or bad patch cable) was able to quickly accommodate a second high-availability failure.

This isn't as unusual as you might imagine. When someone mispatches a cable, the subsequent repair job or hasty "What's wrong with this?" debugging often causes additional failures in short order. Products that passed the failback tests did so with the same loss rate and failover time for their original failover tests. We didn't see any differences.

The NetScreen-100's failback performance wasn't entirely surprising, as this version of its high-availability code was so new that the bits were still warm when we tested it.

While the NetScreen-100 was the only product that failed the failback tests outright, these exercises still stressed out products from most of the vendors. StoneBeat FullCluster 2.0, RainWall 1.5 and ServerIron XL depended on the underlying Solaris operating system for their VPN servers, and a clean boot of Solaris from power on to packet passing took more than 5 minutes on the Sun E450 systems.

This means that if you have a power failure in one of your Solaris systems, getting ready for the next event is going to take at least 5 minutes. If the power failure happens and your disk is corrupted — not uncommon in Unix — it could take hours.

The RainWall 1.5 also had some

suspicious results in which it was unable to complete some runs of our failback tests. When we tried to reproduce the problems with Radguard technical support on the phone, everything worked fine. Although we were eventually able to run the test bank without problems, some of our early runs were timed a little too closely and caused total VPN failure.

Another high-availability issue we investigated was the impact of load on failover time (see failover results graphic, below). Although our 400 IPSec Security Associations comprised a fairly modest load for an enterprise VPN device, the bandwidth requirements pushed these systems pretty hard. Radguard's cIPro 5000 showed the stress of this load quickly, increasing its failover time with each jump in load from about 12% traffic loss with a 2M bit/sec data load to less than 30% traffic loss with a 40M bit/sec data load.

Of even greater concern was Check Point's performance. As part of Check Point's proprietary failover strategy, its products renegotiate its IPSec Security Associations when moving from one system to another. Unfortunately, that heavily affects its ability to fail over large numbers

of Security Associations. We saw this in all of the high-availability partners, even though some were unaware that Check Point was doing it. We measured a time of 25 to 30 milliseconds per Security Association for failover, which is what dominated the time measurements for Check Point's partners to failover from one system to another. Those milliseconds also add up: A gateway with 10,000 users attached would take more than 5 minutes to recover.

On the positive side, we found that CryptoCluster 2500 and NetScreen-100 had little or no significant difference in traffic loss as load increased. Alcatel's 7137 SVG hardware had the same characteristics until we hit the wall at 40M bit/sec. For those systems, failover seems to take the same amount of time at virtually any speed.

Picking your HA option

Overall, we found ourselves preferring the hardware-based products over software-based products for three reasons. First, the software offerings all depended on more complex and physically larger configurations. That reduces total system reliability — not a goal of this high-availability system. While Sun has a reputation for reliable equip-

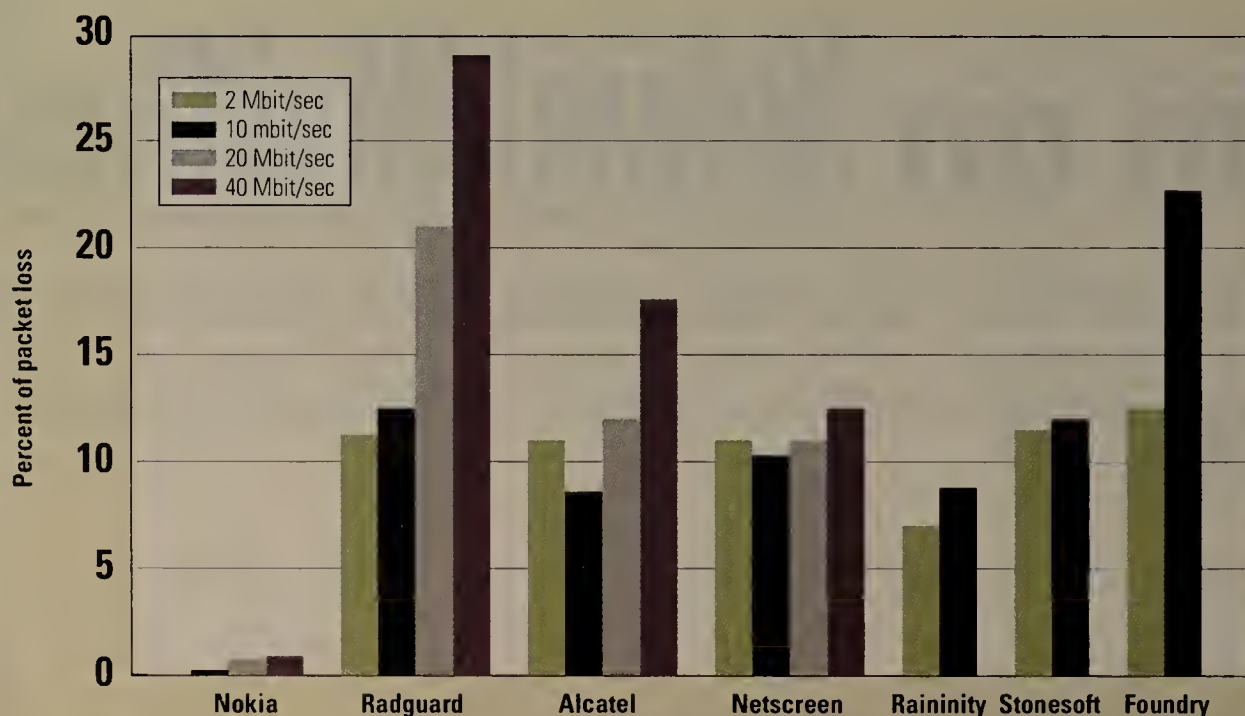
ment, it's difficult for a product that combines hard drives, power supplies, fans, a general purpose operating system and software from multiple vendors to match the reliability of a single-vendor product in a small package. The more components, the greater the likelihood of component failure. This doesn't necessarily translate into system failure, but it makes life more difficult for the network manager trying to design a reliable system.

A second reason for our hardware-over-software preference was management complexity. The software-based products, as well as Foundry's Server Iron XL, required operating system installation and support, VPN-1 installation and sup-

See **Review**, page 84

A closer look at VPN recovery time

As part of our failover assessment of these products, we measured the changes in failover performance as network load increased. Nokia, Netscreen and Alcatel's products showed very little change to how quickly one VPN device could failover to the second as network load increased. However, Radguard's cIPro saw a sharp increase in packet loss as throughput rose to 20Mbit/sec and 40M bit/sec. The high availability products running on top of Check Point VPN platform Rainfinity, Stonesoft and Foundry could not complete the higher network load tests as the Check Point configuration used as a base for these test could not accommodate these higher speeds.





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RiverSoft

Continued from page 82

port, and installation and support of the high-availability package. When we contrasted the amount of time and effort to build those products against the few minutes it took us to get Alcatel's 7137 SVG and Radguard's cIPro 5000 up and running, it seemed fairly extreme.

However, we were looking exclusively at the VPN side of the house — if you want a firewall, or already have a firewall, you might have the Solaris/Windows NT and Firewall-1 part already licked. ServerIron XL has a similar edge as the devices we looked at ranged from eight ports of 10/100 up to 24 ports with Gigabit Ethernet capabilities, doing much more than just handling high availability for VPNs.

Finally, we were just astonished at the pricing differences. Crypto-Cluster 2500 and NetScreen-100 seemed inexpensive at \$20,000 compared to RainWall 1.5, Stone-Beat FullCluster 2.0, and ServerIron XL costing five times as much. Although there is a certain element of you get what you pay for — Check Point's firewall capabilities are a hands-down winner over Radguard or NetScreen's firewalls — the VPN side doesn't offer the same advantages.

Snyder is a senior partner at Opus One, in Tucson, Ariz., specializing in messaging and security products. He can be reached at joel.snyder@opus1.com. Elliott is also a partner at Opus One. He can be reached at cbelliott@opus1.com



Snyder is also a member of the Network World Global Test Alliance, a cooperative of the premier reviewers in the network industry, each bringing to bear years of practical experience on every review. For more Test Alliance information, including what it takes to become a member, go to www.nwfusion.com/alliance.

High availability's dark side

BY JOEL SNYDER

The problem with high availability is that it generally tries to make more than one system look like a single box: one IP address, one media access control address. Unfortunately, the growth of LAN switching power has complicated the lives of high-availability products tremendously.

The difficulty comes when you connect high-availability VPN systems to a single LAN Layer 2 or Layer 3 switch. LAN switches don't like to see the same MAC address on multiple ports — that's a network loop, and one of the ports has to be shut down. To work around this, every high-availability vendor has some technique to keep the network happy while doing high-availability magic.

A simple solution to the LAN switch plus high-availability problem is to do away with the switch: plug your high-availability gear into a hub, and then plug the hub into a switch. Unfortunately network managers have become so enamored of their 100M bit/sec switch-to-the-port gear that hubs are just not in their tool kits any more. As NetScreen's Gregory Lebovitz told us, "If I told a customer that they had to use a hub, they'd throw us out of there in a heartbeat."

For our testing, we used a lot of hubs so we wouldn't have to go through a switch reconfiguration for each product. But when you decide to install your high-availability VPN gear, be prepared to spend some time with your vendor's technical support team (and the manuals for your LAN switch) to get it right.

Check Point's answer was even less satisfactory: all of their high-availability partners' solutions use noncompliant IP Security (IPSec). This makes high availability VPN

solutions based on Check Point's VPN-1 proprietary security protocol incompatible with pure IPSec — they'll work with Check Point products, but anyone strictly adhering to the letter of the IPSec law won't be able to talk to a Check Point high-availability cluster.

Check Point acknowledged this issue and told us that it plans to fix it with the next release of VPN-1 in 2001.

Check Point solves the IP and MAC address problem by stepping around it. In the middle of a VPN negotiation, Check Point will hand off the connection to one of the nodes in the high availability cluster, and that node will start using its own unique IP and MAC address. There is no problem with LAN switches because everything is behaving like a normal IP node. Everything but the IPSec part, of course, which doesn't let you change IP addresses in the middle of a transaction.

We queried the authors of the IPSec request for comment about this and got a resounding vote of no-confidence for Check Point's strategy: it may be high availability, but it's not RFC-compliant IPSec. We also discovered in talking to Check Point partner Rainfinity (the first VPN-I- based solution we tested) that it had never tested its solution with anything but Check Point products. We successfully gained interoperability between the various Check Point partners, however, and had our Rainfinity

cluster talk to the Stonesoft cluster and then to the Foundry Networks cluster easily.

The benefit of Check Point's strategy, though, is that they can jump beyond the 100M bit/sec limit (200M bit/sec if you count full-duplex) for Fast Ethernet. Radguard, Nokia, NetScreen and Alcatel are limited to what you can pump down a single Fast Ethernet pipe.

With Check Point passing connections off to nodes with unique IP and MAC addresses, the cluster can go beyond that limit. NetScreen has its own solution with its higher-end NetScreen-1000, which supports Gigabit Ethernet; Nokia said it will be shipping its Gigabit Ethernet hardware after the first of the year.

Radguard was unapologetic about its high-availability strategy, which also depends on a proprietary technique. However, Radguard points to Check Point's approach as reducing total security, by not following the IPSec specifications and by exposing sensitive keying material in the connection between two Check Point VPN-1 nodes. All the devices but Radguard have a similar "shortcoming;" they share state information about the IPSec connection to support failover. Radguard doesn't like the idea of having this information travel over the wire, so it set up a proprietary technique providing two Security Associations for every one it needs: one to the master device and one to a slave. When the master goes offline, the Radguard system simply switches over to the slave. Because the connection was set up ahead of time, the switch-over can happen quickly. In effect, Radguard takes its high-availability penalty upfront, by setting up the IPSec Security Association to the back-up device (slave) at the start. ■

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Management Strategies

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Virtues and vices

Character-based ethics help you navigate moral dilemmas that may arise in your career.

BY DANIEL SCHROEDER

Several years ago I took a consulting assignment with the research arm of a large technology firm. Initially, my work centered on developing network technologies to run embedded systems used for electric power distribution.

When funding became tight and the company wanted to keep me on until the next budget cycle, my responsibilities shifted to supporting research scientists who were building a combat weapon for the military. Essentially, I was asked to go from reading electric meters to making deadly weapons — an activity I found ethically troubling.

Most of us are familiar with computer ethics codes from the Association for Computing Machinery (ACM) and the IEEE, as well as various codes promulgated by universities, employers and other professional societies. But these codes tend to address the needs of employers and high-tech firms rather than the needs and concerns of employees who may feel morally compromised.

In the past 20 years, I have worked in four IT departments and seen dozens more as a consultant. I've come to the conclusion that every IT job comes with built-in moral dilemmas. For example, network administrators might have to invade the privacy of co-workers, and e-commerce experts may indiscriminately spam the public.

Perhaps more significantly, ethical dilemmas also derive from the nature of vertical markets and the businesses that use IT. Serious moral dilemmas exist in the healthcare, retail, energy, education and finance

industries, just to name a few. For example, working in a hospital might entail supporting abortion services or genetic research. And employment in the industry sector might include supporting nuclear power plants.

Handling these moral issues isn't easy. ACM's code of ethics was not helpful to me in deciding whether to support the development of weaponry.

What's more, behavior-based ethics codes — what we should and shouldn't do — don't work in the Internet world. There's no way to enforce the rules across geographic and political boundaries, and different societies and cultures will honor different sets of rules. Perhaps it's time to revert to character-based ethics, which prevailed several hundred years ago.

Ethical codes based on character are sometimes called virtue-based ethics. Such systems delineate desirable and undesirable character traits as virtues and vices. Virtue-based ethics provides valuable assistance in the quest for morality, thanks to its emphasis on character development.

Virtues in the information age

Some of the virtues of the information age include competence, which is definitely a benefit in IT; and integrity, both personal and professional. Open-mindedness is essential in an industry where everything changes so quickly. Confidence, when warranted, is a valuable trait. Diligence is necessary for seeing our work through to the end. Finally, consistency is important so people will know they can rely on us.

One negative trait is avarice — not petty greed, but the kind of striving for wealth and possessions that decimates us and those around us. Ignorance is also a vice in a vocation that depends on detailed knowledge and experience, and indifference is another.

This list of virtues and vices is hardly comprehensive. Anyone could add to it, and it's prudent to do so. Identifying your values is the first step toward obtaining virtues and minimizing vices.



From there, we need discipline and experience to see how our values play out in our professional lives.

When you're considering a new job, ask your prospective employer about situations that may arise in which you might feel morally compromised. Also, think about the company's industry. Are there known ethical dilemmas in this industry that will conflict with your own values? Before accepting the job, tell your new employer if there are things you will find ethically troubling.

If you find yourself compromised in your current job, don't panic. Talk with management and human resources about your concerns. Perhaps you can work on a different project.

When I was asked to support weapons development, I had a fallback position ready. Because I had told the company prior to joining that I wouldn't work on weapons, there was no surprise when I asked for another assignment. I ended up working instead on a verification test suite for a low-voltage network technology slated for use in petrochemical plants. At least for me, the work wasn't ethically troubling.

Schroeder is a network analyst and consultant with a catalog retailer in the Midwest. He can be reached at daniels@uwinet.net.

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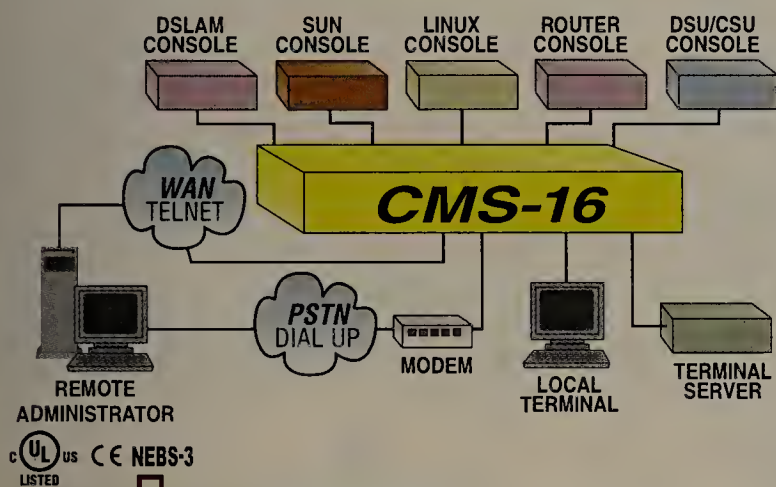
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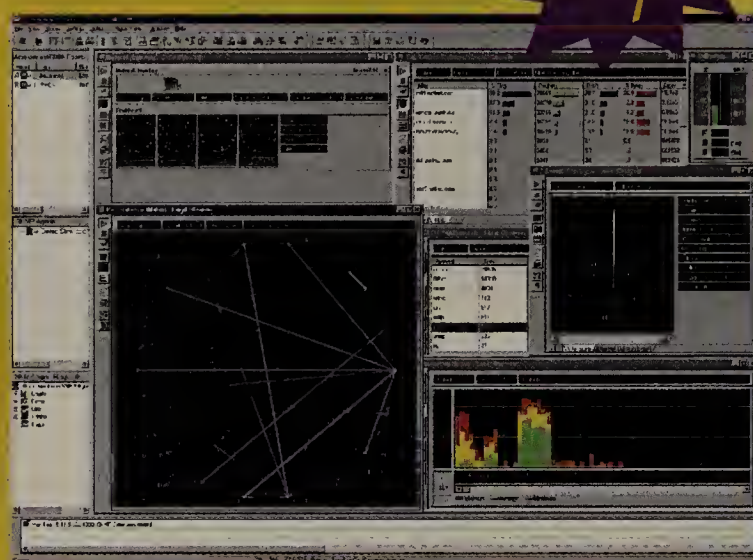


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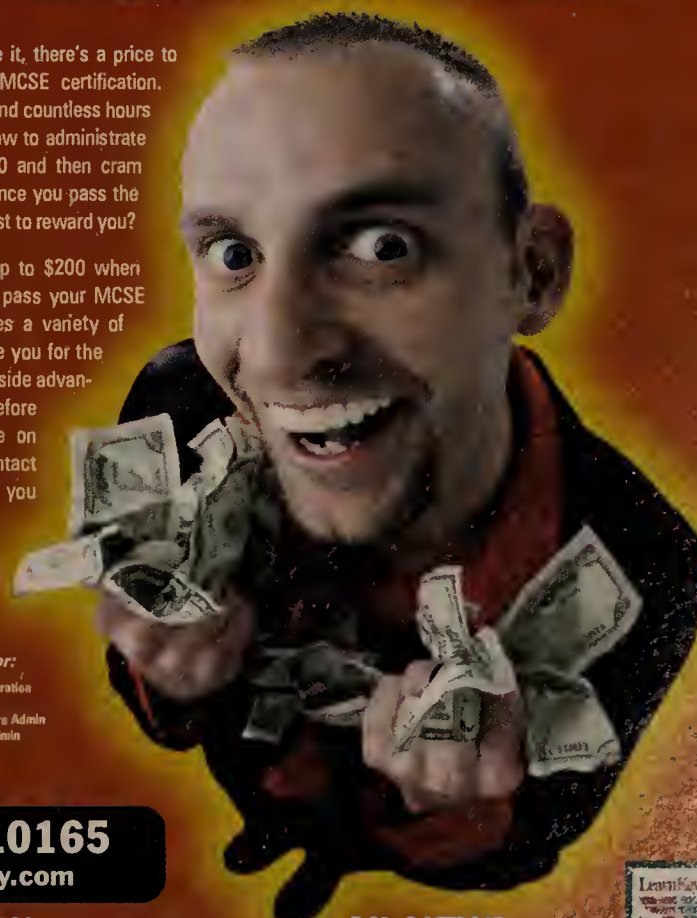
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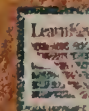
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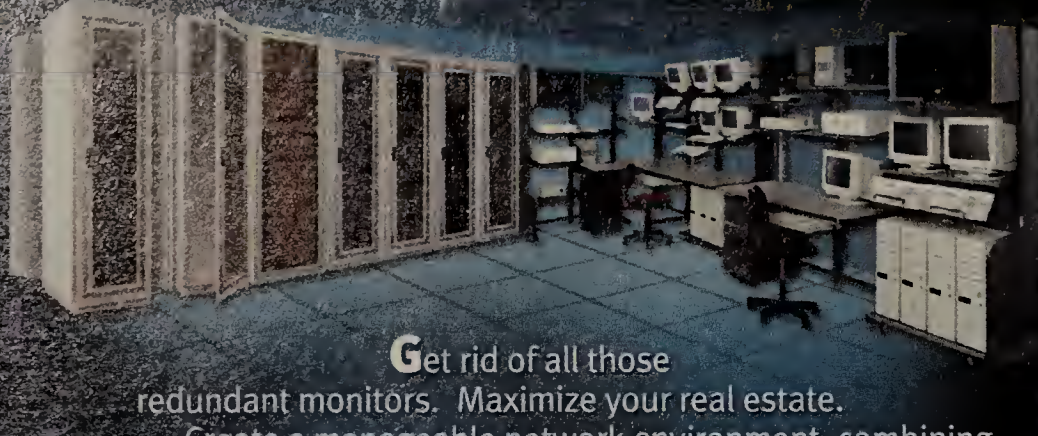
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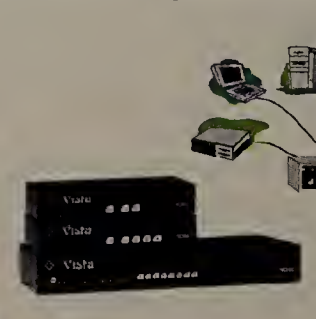
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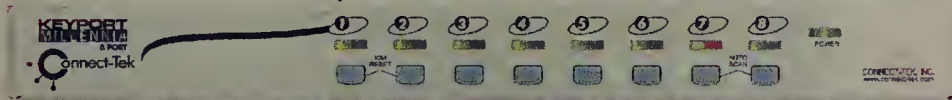


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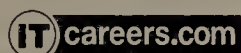
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Minimum requirements: baccalaureate degree in management information systems of the equivalent plus three (3) years related experience. Prior experience must include three (3) years multi-platform programming experience (including OS/2) and LAN systems integration experience in large enterprise environments. Salary: \$85,000. per year. Must have definite right to work in U.S. Send resume to Golden Code Development Corporation, Attn: Mosetta Palmer; 1455 Old Alabama Road, Suite 135, Roswell, Georgia 30076.

SOFTWARE ENGINEERS (8 positions): require Bachelor's in Engineering/Computer Science/Mathematics/Science or closely related field with experience providing skills in described duties, at \$60,000 per year; Senior Software Engineers (8 positions) with Master's and two years experience, at \$65,000 per year. Provide on-site consulting in design, analysis and development of software applications for legacy systems in IBM mainframe environment; development and administration in Oracle, DB2, SOL, Server and Sybase; e-commerce and web applications development in Microsoft, Java and related technologies; network management systems development with a Netscape Server and related tools; SAP R/3 applications on Windows with DOS and ABAP/4 and related modules. 40% travel to client sites in the United States. Mail resumes to: YASH Technologies, Inc., Human Resources, 605 17th Avenue, Suite 1, East Moline, IL 61244.

Sr. Software Engineer (multiple openings): Design, develop & implement software systems. Two yrs. of exp. in job offered or as a computer professional including two yrs. of demonstrable exp. with: 2 of A, 2 of B and 2 of C; or 3 of A and 3 of B; or 3 of A and 1 of C. A) Java, TCP/IP, HTML, EJB, MFC, CGI, PERL, ASP, COM/DCOM, Active X, MTS; B) Wing 3.1, Win NT, Win 95, Win 98, Unix, HP-UX, IRIX, Sun OS; C) Visual Basic, C++, C, Visual C++, PowerBuilder, Visual C. Work requires travel & relocation. Masters degree in one of several ltd. fields: computer sci/appls, math, chem., physics, or eng. Will accept B.S. plus 5 yrs of progressive exper. as comp. professional. Salary: \$85,000 per/yr, F/T. Please submit resumes to: Mr. Terrance Kinney, Mgr., Armstrong Cty. Team PA Careerlink, 1270 N. Water St., PO Box 759, Kittanning, PA 16201. Reference: Job Order No. WEB137970.

SOFTWARE ENGINEER to provide on-site consulting to analyze, design, develop, test, implement and maintain enterprise wide custom client/server systems using PowerBuilder, PFC, Sybase, Oracle and Watcom SOL under Windows 95/NT and DOS operating systems. Require: M.S. (or equivalent) in Computer Science/Information Systems and three years experience in the job offered or any experience providing skills in described duties. B.S. degree with five years experience may be substituted for M.S. and three years experience. 40% travel required to customer sites within the United States. Salary: \$64,000 per year, 8:30 am to 5 pm, M-F. Send resume to: Vice President, Sharper Logistics, Inc., 615 Beaver Ruin Road, Suite A, Lilburn, GA 30047.

Multiple openings. Senior Analyst, Programming. Duluth, GA. Develop, modify, and implement complex information systems. Code and implement efficient architecture components that conform to company's architectural standards. Provide technical consulting regarding architectural principles and development techniques. Plan and execute accurate test plans. Prepare programming estimates for new projects, enhancements and application maintenance. Provide training for less experienced developers. Use FILE-AID, COBOL, CICS, DB2, XPEDITER and VISIO. Req.: B.S. in CS, IS or related field and working knowledge, through academic coursework or experience, of FILE-AID, COBOL, CICS, DB2, XPEDITER and VISIO. In lieu of bachelor's degree will accept equivalent progressive work experience. Jennifer Falk, Federated Systems Group, 5985 State Bridge Road, Duluth, GA 30097. Please reference CJ100.

COMPUTER. Lockheed Martin, the leading information service and solution provider, currently has challenging career opportunities for Software Engineers in our Rockville, MD office. Software Engineer - Design and code complex computer systems for high volume transaction processing & revenue management applications using C language & VMS operating system. BS in Comp Sci or related discipline w/3 years exp required. Software Engineer Level II - Design & code complex computer systems for high volume transaction processing & revenue management applications using C language, VMS operating systems & Rdb database or Forte. MS in Comp. Sci. or related discipline + 2 yrs exp or BS in CS or related w/5 yrs progressive exp required. Salary \$65-75K. Please fax resume to (201) 836-4466 or email: ern.k.mcwilliams@lmc.com An Equal Opportunity Employer.

Consulting firm seeks Computer Professionals, Progg. Analyst w/B/S 2 yrs. and/or Software Engg. w/M/S & 1 yr exp. with foll. skills. Will accept a combination of Edu. & Exp. in lieu of a BS or MS degree.

- Cobol/400, RPG/400, SOL/400, DB2/400
- C++, Unix Progg., Active X control Progg.,
- VC++, MFC, Java, EJB, Corba, Java Servlets,
- JDBC, ATG, VB, ASP, COM, DCOM, SOL,
- Oracle DBA, Sybase DBA, HP Unix, Sun UNIX

Travel & reloc. Req. Excel. Salary & Benefit Package

Apply w/resume to Softek Information Services, Inc., Attn: Recruiter, 655 Amboy Avenue, D-Wing, 2nd Floor, Woodbridge, NJ 07095.

SOFTWARE ENGINEER to provide on-site consulting to analyze, design, develop, test, implement and maintain customized financial and accounting application systems using COBOL, DB2, VSAM, JCL, SDF, MF-Revolve and CICS on IBM mainframe under MVS operating system. Require: Master (or equivalent) in Computer Science/Information Systems/Business Administration and three years experience in the job offered or any experience providing skills in described duties. Bachelor's degree with five years experience may be substituted for Master's and three years experience. 40% travel required to customer sites within the United States. Salary: \$64,000 per year, 8:30 am to 5 pm, M-F. Send resume to: Vice President, Sharper Logistics, Inc., 615 Beaver Ruin Road, Suite A, Lilburn, GA 30047.

SOFTWARE ENGINEER to design, develop, analyze, test, install and maintain application and database software using Rational Rose object-oriented design tool, C/C++, Pro*C/C++, Visual C++, Visual Basic, Korn shell script, Perl, Rogue Wave, SOL, SOL Plus, PL/SOL, Oracle, Sybase and Informix on UNIX, Windows and DOS operating systems involving client/server design architecture evaluate client's needs, analyze system requirements and develop software systems for revenue management. Require: M.S. in Computer Science or Information Systems and two years experience in job offered or as Software Programmer/Developer. Salary: \$64,000 per year, 8 am to 5 pm, M-F. Apply with resume to: Manager, Human Resources, Talus Solutions, Inc., 2839 Paces Ferry Road, Suite 1000, Atlanta, GA 30339.

Director of I.T. Services, Framingham, MA: Identify market and deliver information technology services, including oversight of sales, marketing, recruiting and delivery teams. Identify clients for company's information technology service offerings and formulate strategies for selling in diverse teams. Identify technical resources and source them globally through effective recruitment programs. Manage client relationships and oversee delivery of IT services through multiple channels. Req'd. Masters in Comp.Scie. or Mngmnt. or Engg. 5 yrs. exp. in job offered or 5 yrs exp. in any computer related profession. 40 hrs/wk., 9a-6p, Mon-Fri., \$90,000/Yr. Applicants should submit two (2) copies of his/her resume in response to: Case #20003582, Labor Exchange Office, 19 Staniford St., 1st Fl, Boston, MA 02114.

Business Analyst, Framingham, MA: Analyze research data on technology trends and prepare management reports pertaining to the development and implementation of customized software applications using Lotus Notes, Cobol, Java, Visual Basic or SOL technologies. Conduct technology, financial and business related feasibility studies for launching new lines of business. Analyze the business opportunities vis-a-vis company's technical service capabilities. Help in deployment of technical personnel for delivery of IT services. Req'd. Masters in Buss Adm or Comp. Scie. or Engg. or Math. 1 yr. exp in job offered. 40 hrs/wk., 9a-6p, Mon-Fri., \$70,000/Yr. Applicants should submit two (2) copies of his/her resume in response to: Case #20003332, Labor Exchange Office, 19 Staniford St., 1st Floor, Boston, MA 02114.

SYSTEMS ANALYST to provide on-site systems consulting in analysis, design and development of business applications for manufacturing, distribution and retail industries using CASE tools (Progen) on IBM AS/400; provide customization and implementation of ERP packages (JDE) including Shop Floor tracking systems (MESA) using RPG, RPGLE, COBOL, C and SOL, and interact with user groups to determine system requirements. Require: B.S. in Computer Science/Electronics Engineering and two years experience on AS/400 in the described job duties. 40% travel to client sites within the United States required. Salary: \$61,500 per year, 40 hours/week, M-F. Mail resume to: Vice President, Frontline Consulting Services, Inc., 8701 Mallard Creek Road, Charlotte, NC 28262.

Systems Analyst wanted by New Jersey based eCommerce Co for job loc throughout the US. Must have 3 years of college & 2 years s/ware exp. Respond to: HR Dept, eComserver, Inc, 116-200 Village Blvd, Princeton, NJ 08540. (Ref. RG 7186).

Fourth Generation, Inc. (NJ) Seeks Programmer Analysts for Sr/Jr level:

Dsgn, dvlp fin'l, distribution & mfg systems AS/400 using RPG/400, SOL/400, CL/400, COBOL/400, DB2/400, APIs & Data Oues, Knowl of Fox Pro, C/C++ & Java;

Oracle Dev. tools: Dev 2000, dsgnr 2000, Forms & Reports; Needed PL/SOL, SOL*PLUS & VB on Unix & Win envirn.

Reqd. MS or equiv. in educ & exp. in Electronics/CS or related field plus 1 yr exp for Sr. positions and BS in Electronics or CS plus 2 yrs exp in s/ware dev. Competitive sal & Benefit pkg. Reply to HR, Fourth Generation, Inc., 214 Highway 18 N, Cosner Center, East Brunswick, NJ 08816. kumar@fourth-generation.com

VP/R&D/Product Architect, Atlanta. S/ware product design & development for Internet based business-to-business commercial apps. using extensive skills in mainstream web tech. S/ware development to include technical research, project planning, analysis & design using the Power Designer tool & preparation of technical designs & proposals; perform pre-sales support (high level product demos. & tech. input); post implementation training & support. Develop support & maintain software programs in UNIX & MS Windows NT. Required: Bachelor's Deg. or foreign equivalent or equivalent in edu. and/or experience or any combination of both, + 5 yrs. exp. in Product Mgmt. managing s/ware development for UNIX/PICK databases. Fax resume to 770-393-3691.

Senior Computer Systems Analyst: Primary responsibilities include managing all administration aspects of company's Siebel Sales Marketing Information System. Perform MS SOL database administration tasks. Monitor Siebel configuration project performed by consulting company. Manage reporting system and intra-web development for company's internal use. Requires: M.S. in Information Technology. Demonstrated ability in database administration of Oracle and SQL Server databases. Knowledge of Windows NT, C++, Delphi, Visual Basic and Java Script. 40hrs/wk (9-5); \$66,000.00/yr. Send two resumes/ responses to: Case Number 20003184, Labor Exchange Office, 19 Staniford Street, 1st Floor, Boston, MA 02114.

SYSTEMS ANALYST (Baltimore): Analyze system specifications, user requirements & procedures that support financial and investment operations. Reqs. Master's in Electrical or Computer Engineering & 6 mos. exp. systems analysis in the finance and IT sectors, conversion of data into mult. tables in an Oracle Dbase, design and dvlpmt of programs that interface with Oracle Dbase and alpha testing and maintenance of UNIX workstations. Send resume to: John Dall, Deutsche Bank, 130 Liberty St., #10PS7, NY, NY 10006.

Sr. Programmer/Analyst sought by a commercial bank. Must have masters in Comp. Sci. or any Engg 2 yrs. exp. in designing, programming the Banking Inf. Management System. Response to H.R. Dept., HSBC, 452 5th Ave., New York, NY 10018.





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Software Engineer (one opening): Design, develop, and debug computer software systems, using RDBMS products on Windows NT and Unix platforms. Design test plans for RDBMS-based applications. Run and analyze tests, resolve errors, suggest or implement solutions. Update documentation and perform user consultation.

Reqs: Positions require BS in CS, Engineering, or related field plus 1 year of experience (will accept two additional years of experience in lieu of degree). Experience must include 1) RDBMS, 2) PL/SQL, 3) HTML, 4) Unix.

Job site/interview: Colorado Springs, CO. \$69,534.00/yr. 40 hrs/wk. Application by resume only. Send resume to job order number CO 4683369, CO Dept. of Labor & Employment Programs, ATTN: Jim Shimada, Two Park Central, Suite 400, 1515 Arapahoe St., Denver, CO 80202-2117. EOE.

Programmer Analyst (2 positions) - Plans, develops, tests and documents computer programs, applying knowledge of programming techniques and computer systems. Will utilize Fox Pro and RPG 400. Will perform routine tasks and will work under close supervision while assisting staff. Work is closely monitored and reviewed for accuracy. Requires 3 yrs experience in the job offered or 3 yrs experience as Systems Analyst, Software Engineer or Systems Engineer. Must have 1 yr exp using FoxPro and RPG 400. 5 day, 40 hr/wk, \$47,000/yr. Please mail resumes to Colorado Department of Labor and Employment, Employment Programs, ATTN: Jim Shimada, Two Park Central, Suite 400, 1515 Arapahoe Street, Denver, CO 80202-2117 and refer to order number CO4683608.

Concio head quartered in Santa Clara, California, a leader in software development and internet solutions, has multiple senior and entry level positions available for: Programmer Analysts, Software Engineers, Project Managers, IT Consultants, & Database Administrators. If you are a highly motivated individual send your resume to CMOS HR Dept at 408-988-4051.

Engineers/Consultants/Programmer/Analysts needed. Several senior and entry level positions available for qualified candidates possessing MS/BS or equivalent and/or relevant work experience. Work with some of the following skills: HP3000, COBOL, POWERHOUSE, Supertool, Unix and Oracle. Must be willing to travel and relocate as required. Fax resume to SOFTMATRIX, Inc. at 916-786-5140 in Roseville, CA.

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Sr. Software Engineer sought by high-speed fiber optic switching design & development company in Broomfield, CO to, at a senior level, engage in full-life cycle software development. Specifically, create embedded software applications that run on proprietary operating systems, web-based applications, &/or internet, client/server software applications. Analyze requirements. Create designs & design documentation. Code, test, & debug the software applications. Engage in code review & create technical documentation. Engage in project management as required. Use object-oriented analysis & design methodologies, C/C++, proprietary debugging programs, & other tools & languages in the design & development process. Provide technical assistance & mentoring to other Software Engineers. Requires Master's, or equivalent in Computer Science or related field. Specifically, this position requires a Master's, or foreign degree equivalent, plus 3 yrs of progressive software development experience, or a Bachelor's, or foreign degree equivalent, plus 5 yrs of progressive software development experience. Working knowledge of full life-cycle software design, C/C++, & object-oriented analysis & design methodologies. \$78,100/yr. M-F; 8am-5pm. (5 openings). Respond by resume to James Shimada, CO Dept of Labor & Employment, Tower II, #400, 1515 Arapahoe St., Denver, CO 80202, & refer to Job Order No. CO4683686.

hp, one of the "Most Admired Companies in America" according to Fortune Magazine's latest ranking of U.S. - based companies, is a global leader in everything from computer systems and solutions, to test and measurement systems. We have opportunities available in Fort Collins, Greeley and Loveland, Colorado in the following positions:

- Communications Manager
- Hardware Design Engineer
- Software Design Engineer
- Product Marketing Engineer/Product Manager
- Member of IT Technical Staff
- Information Technology Specialist

hp offers competitive compensation and excellent benefits, including profit sharing, stock purchases, 401K and a retirement plan. We invite you to e-mail your resume indicating Ad #8324 to: resume@hp.com (Subject Line: Ad #8324), or send/fax it to Hewlett-Packard Employment Response Center, Attn: Ad #8324, 3000 Hanover Street, MS20AZ, Palo Alto, CA 94304-1181. FAX: (650) 813-3860. Please be sure to include Ad #8324 on your resume.

hp is an equal opportunity employer dedicated to affirmative action and work force diversity.

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POSITIONS: Senior Technical Support Analyst (multiple openings)

POSITIONS DESCRIPTION: Working independently, provide technical interface to customers in resolving problems related to installation, maintenance, usage and workarounds for financial and manufacturing products and applications. Design, develop and debug computer software system diagnostic tools, specifically related to financial and manufacturing applications based on RDBMS technology. Resolve technical product and testing issues, provide code fixes and resolutions, and conduct beta release testing. Lead in identifying and developing new enhancements to customer interface features and products, and plan and implement their portability. Coordinate with other engineering staff to evaluate operational and performance requirements, and suggest process improvements.

EDUCATIONAL REQUIREMENTS: MS in CS, Engineering, Math, Physics, or related field, or foreign equivalent (see Special Requirements below).

SPECIAL REQUIREMENTS: Positions require MS in CS, Engineering, Math, Physics, or related field, or foreign equivalent, plus 2 years of software Engineering experience. Experience must include:

- 1) SQL
- 2) Windows NT
- 3) Financial Applications
- 4) RDBMS

Job site/interview: Colorado Springs, CO. \$67,400/yr. 40 hrs/wk. Application by resume only. Send resume to job order number CO4683674, Colorado Department of Labor & Employment, Employment Programs, ATTN: Steve Wilkerson, Two Park Central, Suite 400, 1515 Arapahoe St., Denver, CO 80202-2117. EOE.

Web Site Developer sought by non-profit educational research organization in Aurora, CO to, under close supervision, engage in moderately complex tasks regarding designing, developing & maintaining an internet website & internet database applications. Design & implement web based relational database management systems using SQL Server. Use HTML & XML languages to maintain web pages. Modify & create new functionality for database projects. Engage in data migration, storage & recovery. Troubleshoot & problem solve any script issues with the web site & database applications. Incorporate Vbscript, Javascript & Perl in the web front-end, & SQL language to manipulate data at the back end. Requires Bachelor's or foreign degree equivalent, in Computer Science, Engineering, or related field (including Mechanical Engineering). Working knowledge of software application design & development, HTML, RDBMS design, & Java or Javascript. \$52,000/yr. M-F; 8am-5pm. Respond by resume to James Shimada, CO Dept of Labor & Employment, Tower II, #400, 1515 Arapahoe St. Denver, CO 80202, & refer to Job Order No. CO4683724.

Chief Computer Programmer - Will plan, schedule and direct preparation of programs to process data and solve problems by use of computers. Will consult with managerial and systems analysis personnel to clarify program intent, identify problems, suggest changes and determine extent of programming and coding required. Assigns, coordinates and reviews work of programming personnel. Will perform routine tasks and will work under close supervision while assisting staff. Work is closely monitored and reviewed for accuracy. Requires Bachelor Degree in Computer Science, Electrical or Electronic Engineering, Mathematics or other Technical Degree. Must have 1 yr experience in the job offered or 1 yr experience as Programmer Analyst, Systems Analyst or Project Developer. 5 day, 40 hr/wk, \$55,000/yr. Please mail resumes to Colorado Department of Labor and Employment, Employment Programs, ATTN: Jim Shimada, Two Park Central, Suite 400, 1515 Arapahoe Street, Denver, CO 80202-2117 and refer to order number CO4683605.

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SENIOR MEMBER TECHNICAL STAFF/COMMUNICATIONS PRODUCT DEVELOPMENT.

Advanced Research, design, development and implementation of new wired and wireless communication technologies for voice and data applications targeted at Digital Home networking. Responsibilities include software architectural design, software requirement analysis, object oriented design, design of real time embedded system software using C/C++, design of packet structure for realizing IEEE802.11 (b) Compliant Wireless LAN's, design of the interfaces for 10baseT and USB devices to the system, implementation of Forward Error Correction and Reed Solomon error correcting codes, design of base band MODEM with symbol timing and clock recovery. VHDL Coding and prototyping the modem for design validation followed by IC development release is a must. Also responsible for patent filing, documentation, verification and release of the design information, training junior engineers and product development engineers. Requires M.S. or Master of Technology in Electronics/Electrical Communications Engineering, Electrical Engineering, Computer Science or closely related; requires five years experience in design, analyzing and developing software and VHDL codes for two way communication systems; experience must include software development on Embedded system using Real-time operating system, assembly languages, FPGA designs using VHDL, Communication protocols for wireless two-way connectivity, error correction codes and burst mode controllers. Must have current authorization to be permanently employed in the United States. Annual salary of \$68,000. 40 hours/week (8 am - 5 pm). Send resume with Social Security Number to: Indiana Department of Workforce Development, 10 N. Senate Avenue, Indianapolis, Indiana 46204-2277. Attention: DPG, Reference: I.D.# 8097929.

Analyst Programmer. Assist in solving business problems and improving productivity by assisting in the efficient use of technology through the development and support of mainframe and distributed computer systems and completion of complex project tasks. Research, analyze, define, recommend, and facilitate agreement with users on system requirements and feasibility. Communicate systems opportunities and constraints in terms users can understand to promote use of technology in meeting business needs and provide support for production systems, including off hours support to negate or minimize delays to the operating system. Assist in the development of user and/or technical specifications; assist in the development of project plans and implementation schedules; develop basic systems designs; write complex codes; document program system functionality; develop test plans and test and verify accuracy and completeness of changes; debug computer programs, systems and business related problems; and implement new or enhanced systems/programs. Bachelor of Arts in Computer Science and two years of experience in job offered is required. Experience must include programming languages COBOL, JCL, TSO, SQL, DB2, CICS; operating systems MVS, UNIX, DOS, WIN 95/NT, VAX, OS/2, WIN 3.X; UNIX hardware; software including TSO/ISPF, VSAM, Access, Excel, Lotus 123, Borland Paradox, Dbase, SQL server, Telon, Autocad, and IDEA-Software; and Data Mining and Data Warehousing technology. Must have current authorization to be permanently employed in the United States. Annual salary of \$56,800. 40 hours/week (8 am - 5 pm). Send resume with Social Security Number to: Indiana Department of Workforce Development, 10 N. Senate Avenue, Indianapolis, Indiana 46204-2277. Attention: DPG, Reference: I.D.# 8099192.

Software Specialist: Bloomfield Hills, MI: Perform advanced research & development of software technologies & apply them to the development of Occupant Sensing Systems, specifically software for Ultrasonic/Optical Spatial Sensing & weight sensing systems, to increase functionality & performance. Develop software algorithms w/ particular emphasis on more advanced concepts like Artificial Neural Networks & Fuzzy Logic for implementation into micro processor electronics or computer programs. Work closely w/customers to adapt the technology to application programs (platforms). Present the results & technology both internally & externally. Plan development & document software designs according to approved standards & code as appropriate to a level that can be used for prototyping or product implementation. Apply the APDS development procedure to the development process. Master's Degree or educational equivalent in Electronics Engineering Systems Engineering or Software Design & Engineering & 2 yrs experience in the position offered or in a related software/systems engineering position. 2 yrs experience must include experience in (1) software systems design & analysis specifically in ANN & Fuzzy logic as applied to safety-related systems for the automotive industry; (2) microprocessor systems particularly embedded systems; (3) ultra sonic or other wave phenomena modeling; & (4) MatLab/LabView. 40 hrs per week. \$70,000 per year. Resume to Human Resources, Autoliv, 1320 Pacific Drive, Auburn Hills, Michigan 48066.

Internet Developer, Database: Designs, Implements, develops, and modifies various software and software systems for implementation into a relational database management system which is installed in a networked client/server environment. Develops appropriate protocols, hardware and software integration and related data acquisition and transmission procedures for use in both internet and intranet multiple business applications for use internally and for corporate customers. Uses SQL and related database software tools to insure appropriate integration of processes and related data for both hardware and software to be used in the analysis of various manufacturing as well as management information purposes to allow necessary business decision-making processes. Requires M.S. degree in Computer Science. Also requires six months experience in the job to performed or sixmonths experience as a Computer Laboratory Assistant. Experience must include development of networked protocols in a client/server environment. Hours 9am - 5 pm. 40 hours per week at \$62,000 per year salary. Applicants must show proof of legal authority to work in the U.S. Job Location: Bedford Park, Illinois. Please send two copies of resume and cover letter to: Illinois Department of Employment Security, 401 S. State Street - 7 North, Chicago, IL 60605, Attention: Sheila Lindsey, Reference #V-IL 24413-L AN EMPLOYER PAID AD. NO CALLS

Senior Systems Engineer. Resp for requirements definition, analysis, information modeling, relational database design, development of testing, implementation, data administration & project management in all phases of development life cycle in Client Server/ relational database environment for both online transaction processing and decision support systems in a multi-hardware/ multi-software environment. Design, architect, & deploy large Client Server business systems for government and commercial clients using GUI development tools, including PowerBuilder, Oracle Developer 2000 & databases such as Oracle, Sybase, DB2 on UNIX based HP/SUN/IBM machines and windows based personal computers. Provide 3rd level engineering support & problem resolution at an advanced complex, and multi-tasks level including configuration, application, performance & security management. Resp for coordinating w/ up to 5 programmers, &/or Consultants, and/or Systems Engineers, whose responsibilities include programming, coding, implementation, & testing of Relational Database Systems & interfacing w/ older mainframe systems. Req. M.S. Engineering & 1 yr of exp in job or 1 yr as a Consultant (Computer Design Dev) &/or Senior Programmer Analyst. 40 hrs/wk. Wage is \$68,640/yr. Apply at the Texas Workforce Commission, Dallas, Texas or send resume & ad to 1117 Trinity, Room 424T, Austin, Texas 78701, Jo# TX1025369. Ad paid by an Equal Opportunity Employer.

Manager, Localization and Product Development. Responsible for overseeing Japanese and other Asia-Pacific localization of advanced software products which includes preparation/translation of all translatable files including software user interface, error messages, on-line help, manuals and other documentation. Select and work closely with outside localization services to identify and resolve localization issues while considering cost, performance and delivery date. Validate linguistic quality of localization done by outside vendors and work with the U.S. development and documentation teams to identify and resolve localization issues such as technical accuracy and consistency using Corel Catalyst and Trados WorkBench. Prepare, review and test application programs and on-screen interfaces to determine accuracy, consistency and functionality. Repair problems by working with the U.S. development team and through the use of Microsoft C++ and "Installshield." Direct growth and development of the localization team in Japan and in the United States. Bachelor's degree in Technical Writing and four years of experience in job offered is required. Experience must include management of technical computer software localization; localization tools including Microsoft C++, "Installshield", Corel Catalyst, and Trados WorkBench; technical fluency in Japanese. Must have current authorization to be permanently employed in the United States. Annual salary of \$75,000. 40 hours/week (8 am to 5 pm). Send resume with Social Security Number to: Indiana Department of Workforce Development, 10 N. Senate Avenue, Indianapolis, Indiana 46204-2277. Attention: DPG, Reference: I.D.#8099498.

Programmer, Engineering and Scientific (multiple openings) - Convert engineering problem formulations to format processable by computer; resolve symbolic formulations, prepare flow charts and block diagrams and encode resultant equations for processing by applying principles of engineering; confer with other engineering and technical personnel to resolve problems of intent, inaccuracy, or feasibility of computer processing; enter program into computer system; and use Oracle, Visual Basic and SQL. Req's Bachelor's in Compu. Sci., Systems Analysis, CIS, Compu. Engg., Electrical Engg., Electronic Engg., Mechanical Engg. or Maths or its equiv. in ed. & exp. plus 2 yr. exp. in job offered or 2 yr. exp. in a related occup. as a Programmer, Programmer Analyst, Deputy Manager (Distribution/Logistics), Systems Analyst, Software Engineer or Consultant. Will accept 3 yr. of college ed. plus 3 yr. exp. in job offered or in a related occup. in lieu of the req. ed. & exp. Will also accept any equally suitable combination of ed., training and/or exp. which would qualify an applicant to perform duties of job offered. \$60,901/yr., 40 hrs/wk., 9a-6p, M-F. Send resumes to MDCE/ESA, P.O. Box 11170, Detroit, MI 48211-1170. Ref. No. 244499. Employer Paid Ad.

Web Software Developer. Dsgn & dvlp s/ware using public key infrastructure, encryption technologies, Internet protocols & Java. Utilize UNIX, Java dvlp & other tools to produce custom electronic data interchange s/ware. Dsgn, dvlp, troubleshoot, implt & support s/ware for web apps using Java, JavaScript, HTML, Java Server Pages & servlets. Work w/graphic designers, corporate communications & other members of project team to dvlp apps, interface dsgn & architecture of website. BS in comp sci, engg or related field + 3 yrs exp in job offd or in related occupation such as programmer analyst or s/ware engineer. Must show demonstrated ability to dsgn & dvlp s/ware using Java, HTML, and Java Script on UNIX operating system & demonstrated knowledge of encryption tech & Internet protocols including SMTP, POP3, HTTP & FTP. 40hrs/wk, 55K/yr. Must have proof of legal authority to work in US. Send resume to Iowa Workforce Center, 215 Watson Powell Jr. Pkwy, Des Moines, Iowa 50309-1727. Please refer to Job Order IA1101166. Employer paid ad.

IT PROFESSIONALS NEEDED

Programmer Analysts; Systems Analysts; Systems Engineers; Software Development

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SR. PROGRAMMER ANALYST

Design & implement datawarehousing principles, design & develop processing modules, write hi-speed loader. Enhance/maintain bus, s/ware & comp. prog., write code, prep. test plans. Install s/ware ensuring proper connectivity. Develop queries for data manipulation & interface classes, perform system integration and documentation. Provide tech. support; supervise jr. prgrmr/analysts. Utilize Visual Basic, C/C++, MS-SQL Server, GUIs & Crystal Reports. Must have Master's degree in Comp. Sci., Math or related area. At least 2yr./exp. in similar position. 40 hr/wk. Competitive salary w/ excellent benefits.

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Programming/Analyst II. Cincinnati, OH. Develop, modify, and implement complex information systems. Code and implement efficient architecture components that conform to company's architectural standards. Provide technical consulting regarding architectural principles and development techniques. Plan and execute accurate test plans. Prepare programming estimates for new projects, enhancements and application maintenance. Provide training for less experienced developers. Use Visual Basic, Visual C++, ASP, VB Script, and HTML. Req.: B.S. in CS or related field and working knowledge, through academic coursework or experience, of Visual Basic, Visual C++, ASP, VB Script, and HTML. Salary: \$55-65K/yr. DOE. Jennifer Falk, Federated Systems Group, 5985 State Bridge Road, Duluth, GA 30097. Please reference C105.

Programer/Analyst assigned as Senior ABAP Developer/Analyst to analyze, design and develop programs or systems to solve business needs and problems, utilizing ABAP programming language. Requires Bachelor's degree or equivalent in MIS, Computer Science, Engineering, Mathematics, Statistics or closely related field. Qualified applicants must presently be eligible for permanent employment in the United States. Successful applicant must be able to perform job duties on date of application. Salary \$75,000 to \$85,000 per year, plus company employee benefit plan, 40 hours per week. Send resumes to Mr. Larry Blazevich, Sigma-Aldrich Corporation, 3050 Spruce Street, St. Louis, Missouri 63103. An Equal Opportunity Employer.

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SeniorDatabaseAdministrator. NE OH biotechnology firm seeks Senior Database Administrator; design, analyze, plan, maintain EDP infrastructure system; create, evaluate, plan, budget & install new/modified systems. Master's Computer Science plus at least 1 yr. exp. Send resumes to Mr. Bill Busby, Athersys, Inc., 3201 Cleveland Ave., Cleveland, OH 44115. Equal Opportunity Employer.

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Senior Systems Analyst wanted by Computer Networks Consulting Co. in Woodbridge, IL. Must have Bachelor's Degree in Comp Sci or Elec Eng.

Respond to: Micronet Solutions, Inc., 2436 Concord, Woodbridge, IL 60517.

Software Engineers, Programmer Analysts, Database Analysts needed by IL based IT firm. Please apply with 2 copies of your resume to H.R. Department, Resource America, Inc, 514 Terry Avenue STE#1, Aurora, IL 60506.

Software Engineer and Senior Software Engineer/Systems Analyst wanted by Comp. Consult Firm in Lisle, IL. Must have Master's Degree in Comp. and Info. Science. Respond to TaiRaq Systems, Inc., 4519 Hatch Lane, Lisle, IL 60532.

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Database Administrators needed. Several entry and senior positions available for qualified candidates possessing Bachelor or equivalent and 5 years of relevant work experience in the job offered or related occupation. Work with some of the following: Oracle, Oracle Replication, Ingres, Visual Basic, C, C++, Pro* Cobol, Pro*C, Erwin for datamodeling, UNIX and SQL. Mail resume to First Health-Dept MB/HR, 3200 Highland Ave., Downers Grove, IL 60515 or fax to (630) 719-0076.

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For consideration, send resume to:
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DEPUTY CHIEF TECHNOLOGY OFFICER

The City of Seattle (www.cityofseattle.net) is the culture and technology capital of the Pacific Northwest. Its city government has been recognized for its innovation and sound management of information technology activities. The City's Department of Information Technology (DoIT) is seeking a Deputy Chief Technology Officer (DCTO) who will represent the department and the CTO to the Mayor, City Council, the public and the media and will help create and articulate a technology vision for the City. The DCTO's primary focus will be large applications and specifically the implementation of architectures, methods, and procedures to advance the City's management of IT. DoIT has a staff of 160 full-time employees and an annual budget of over \$40 million.

Responsibilities include application development methodology, change management and the management of software assets, projects, issues and performance reporting relative to applications.

Candidates should have demonstrated successes in improving the performance of large IT organizations through the implementation of methods and practices with extensive experience in application development and implementation. A background in public safety, utility, general government, major ERP systems and web-based applications is ideal. Candidates must be able to function well in a collaborative environment and develop broad-based support for change. Experience with a state or local government is highly desired.

To learn more about this opportunity go to <http://www.cityofseattle.net/jobs/>. Apply by sending a resume and cover letter to Jean Mayes, Human Resources, Department of Information Technology, City of Seattle, 710 Second Ave., Suite 450, Seattle, WA 98104. Please refer to Job #002-18. Position closes on December 31, 2000.

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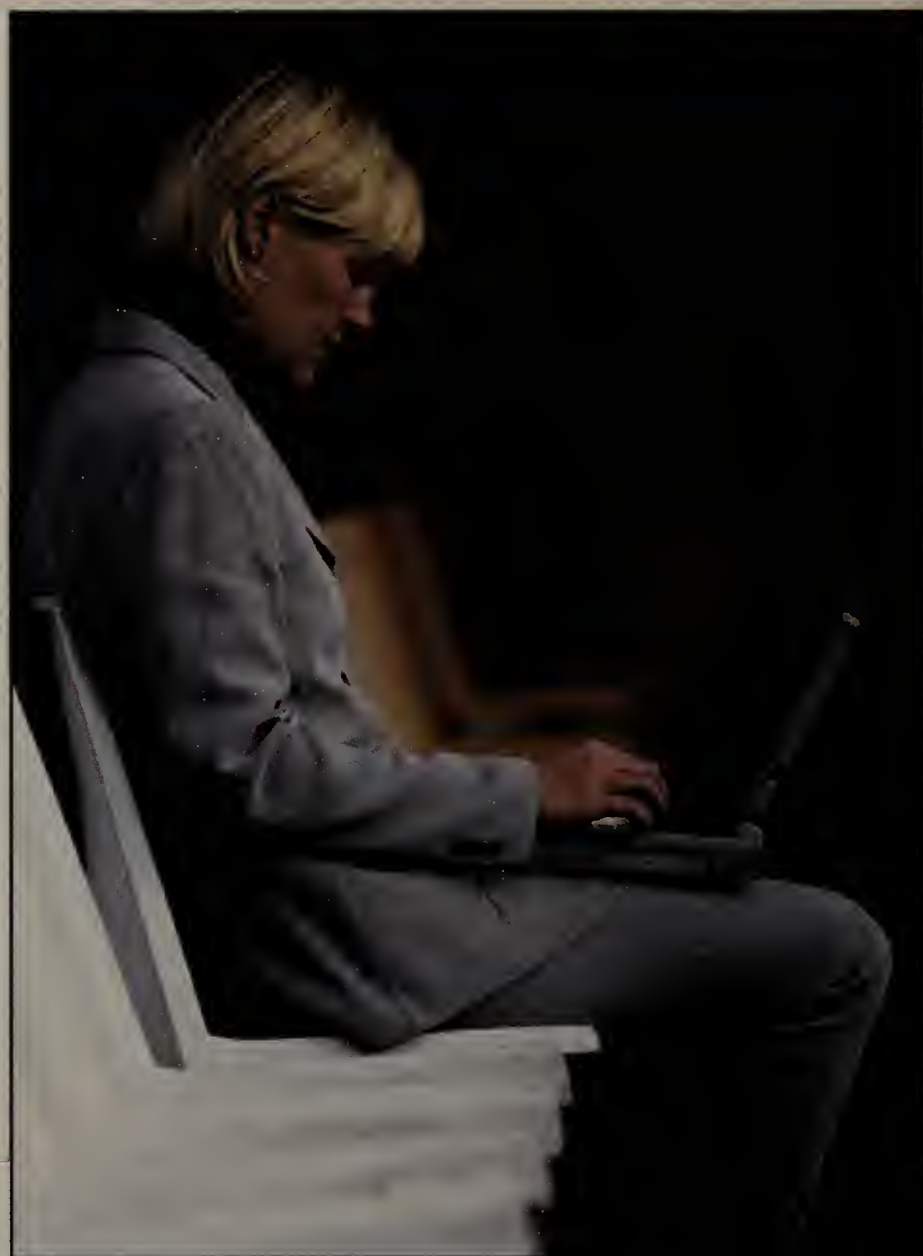
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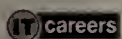
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MON., MARCH 12, 2001
St. Louis Airport Marriott

WASHINGTON, DC

MON., JANUARY 15, 2001
McLean Hilton Hotel

PHILADELPHIA, PA

WED., FEBRUARY 21, 2001
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DETROIT, MI

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Software Engineer: Analyzing software requirements to determine feasibility of design; system analysis and design; consulting with other engineering staff to evaluate operational and performance requirements of the overall system; developing and directing software system testing, programming and documentation. In performance of these duties use DB2, CICS, COBOL, VSAM, MF Revolve and JCL. Requires: Masters in Computer Science, Computer Information Systems, Computer Applications, Electrical Engineering, or Mathematics or its equivalent in education and experience; and 2 yrs. exp. in the job offered. Will accept a Bachelor's degree, or a foreign educational equivalent degree, followed by at least 5 years of progressive experience in the computer software speciality in lieu of the required education and experience, provided that at least 2 years of the 5 years progressive experience is directly in the job offered. \$60,000/yr., 40 hrs./wk., 8a-5p, M-F. Send resumes to MDCD/ESA, P.O. Box 11170, Detroit, MI 48211-1170 & include Ref. #200090. Employer Paid Ad.

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IT CAREERS IN CONSULTING



CONSULTANTS, IN THE PAST, PROVIDED GUIDANCE AND INPUT TO BUSINESS LEADERS ABOUT THEIR ORGANIZATIONAL STRUCTURE AND THEIR BUSINESS STRATEGY. TODAY CONSULTANTS STILL HAVE THESE ROLES, BUT THEY'RE ALSO IMPLEMENTING POWERHOUSE IT SOLUTIONS – FROM SELECTION TO DESIGN OF ARCHITECTURE AND INFRASTRUCTURE THROUGH IMPLEMENTATION, TRAINING AND PERFORMANCE OPTIMIZATION AND MANAGEMENT.

WHAT DIFFERENTIATES ONE FIRM FROM ANOTHER – IT'S THE BREADTH AND DEPTH OF THE PEOPLE WHO WORK THERE. THIS IS WHY CONSULTING FIRMS ARE BUILDING THEIR BUSINESS ONE PERSON AT A TIME, TO DEVELOP THE SKILLS, EXPERTISE, THE BUSINESS SAVVY AND THE ANALYTICAL CAPABILITY REQUIRED BY THEIR CLIENTS.

Ajilon LLC Baltimore, MD

Ajilon's strength is its cadre of experienced IT professionals, according to Melanie Lawrence, senior vice president of human resources and administration. "Our goal is to bring this expertise while keeping the cost in check so clients can live with the projects they need," says Lawrence. Ajilon, with 50 offices across the United States, has more than 6,000 employees. The firm provides services in a full range of sectors – healthcare, financial services, automotive and telecommunications.

While most projects involve some type of web-enablement, Lawrence says Ajilon is seeing more and more sophisticated projects. Recently the company worked with Providence Health Plan in Oregon to develop e-health security systems.

"Throughout your career at Ajilon, you would get to work in a lot of different environments versus one particular type of company. You might work on a financial services project now and then a telecommunications project," adds Lawrence.

As the industry has evolved so too has Ajilon's expertise. "The types of people have changed because the technology has changed so much," explains Lawrence. "For instance, managed services has increased dramatically over the past five years."

Ajilon is looking for people who have applied their technical skills in a business experience. "We need people who have had an impact at a company," Lawrence says. "Our clients expect us to be able to offer counsel on how technology will impact their business decisions. We are providing our clients with a business partner, so this is technology plus knowing when and how to use it to solve a business issue."

Ajilon has openings across the country in the areas of development, application development and implementation. The firm

offers a variety of career options that include leadership, delivery team and technical leadership.

"We see consulting as a long-term career choice. Our retention exceeds the typical consulting company," Lawrence adds. "With our 50 different locations you have the opportunity to relocate and remain with this company. Ajilon University is our in-house education arm where you can get in-house career training, counseling and online training. It's an awesome capability that allows you to stay abreast of technology and business skills."

Arthur Andersen Business Consulting Chicago, IL

If survey results tell a story, Arthur Andersen Business Consulting is putting its knowledge to work not only for customers but also for itself. The firm was rated number one in most every category of the Emerson Survey. Over the past year, Arthur Andersen Business Consulting has distinguished itself from the traditional audit branch of the company and its separation from Andersen Consulting.

"Probably what distinguishes us most is our unique Market IntegrationSM strategy," explains Jim O'Malley, national director of experienced recruiting. "Our client list is impressive, and we're involved with some of the best projects in business. We believe success in today's economy is about deploying new and innovative relationships with customers, suppliers, investors and employees."

In this vein, the firm has partnered with Agilent Technologies to implement a user-centered web design that transformed 45,000 pages of static content into a global e-business environment. O'Malley also points to a project that involved design and management of systems integration of an Ariba/i2 platform for MetalSpectrum, an independent, neutral online marketplace for specialty materials. The marketplace combines

more than 80 percent of the specialty metals market's leading players and links manufacturers, distributors and end-users.

These types of projects require considerable experience. O'Malley says hiring over the past 12 months has been equally divided between new college graduates and experienced hires. "Our greatest success in recruiting experienced talent is from employee referrals," he says. "We're looking for bright people with inventive minds. We need individuals who possess skills and traits that our clients have grown to expect from us – superior technical skills, excellent communication skills, and the ability to work as part of a team."

"There are several reasons Arthur Andersen Business Consulting offers one of the best opportunities available," O'Malley says. "We have a highly sophisticated global infrastructure. There are resources to get the job done. Most people say a large firm like us allows them to work alongside the best and brightest in the industry. We work hard to maintain a high bar when it comes to selecting people. We have a deep commitment to the business of consulting, of bringing together strategic thinking, business knowledge and technical expertise."

Avanade Seattle, WA

What do you have when two mega-giants in the technology and consulting industries pool their assets to create an all-new company? It's a multi-billion dollar startup known as Avanade. Microsoft and Andersen Consulting created the joint venture last spring to provide technology integration for Global 2000 companies and emerging market-makers around the world. Avanade builds on the advanced capabilities of the Microsoft platform to create customized, scalable solutions for complex e-business and enterprise infrastructure.

Adam Warby, vice president of sales and marketing, says the company, just nine months old, has 11 offices worldwide with

IT CAREERS IN CONSULTING



plans to open an additional four by the end of March 2001. "I can't imagine two better partners," Warby says. "We combine the deepest understanding of Microsoft technology with proven experience in delivering results. We don't operate in neutral; we're passionate about Microsoft technologies and dedicated to integrating Microsoft-centric solutions into multi-vendor environments. Our unique partnership gives us an intimate knowledge of Microsoft products and enables us to anticipate the full potential of key technologies in development. Plus, our solution offerings are based on our unique intellectual property in the form of methods, tools and components, so we're able to deliver reliable customer solutions faster. There is a shortage of these capabilities in the market today, particularly when customers need to do everything at e-speed."

Avanade specializes in bringing full functionality and performance to customers through Windows 2000 and the net enterprise server family. The company currently has more than 30 active customer engagements, from Global 2000 companies to new economy players. Projects include a vast range, from assisting e-tail businesses achieve scale and stability on their next-generation sites to migrating a large insurance company and its sales channels to Windows 2000. A third client, a music publisher, is working with Avanade to develop global digital asset management and distribution systems.

"At times we work in tandem with Andersen Consulting team members, but also directly with customers," Warby says. Employees work on teams ranging from two members to 30 out of geographic offices. In the United States, there are five offices — Seattle, Chicago, New York, Dallas and San Francisco. "We believe the skills and expertise we bring are horizontal, meaning that they can apply across multiple industries," Warby explains. The company, which originally announced plans to hire up to 3,000 people by 2002, currently has more than 600 employees and plans to more than double that number by September 2001.

"We need people in systems engineering, solutions development and project management," Warby says. "More than that,

we are looking for people who have a demonstrated passion for technology. Technology is the heart of what our business is. We also like to see a track record for being able to deliver." Because the Microsoft platform is the base expertise, Avanade will be hiring people to design, develop and implement system architecture and infrastructure, which has the Microsoft environment at the center.

"Employees give us several reasons as to why they come to work here," Warby adds. "First and foremost, they are interested in working in an environment where they feel they can have an impact. The ability to have a long-term focus on technology is also key. People who work for Avanade care about the future and want to build it with their own hands. Being part of a brand new company is tremendously exciting. All employees have a stake in the company and share in its success through our stock option program. But because of the backing from two established leaders in their industries, there aren't the same risks associated with being in a traditional start-up environment."

NetEffect Corporation Atlanta, GA

In addition to providing network architecture and infrastructure, management and measurement, interactive call center technologies and managed services to its customers, NetEffect helps clients demonstrate the viability of technology projects and manage the performance and operability of the systems once they're up and running.

NetEffect, a Cisco professional services partner, assists clients by conducting feasibility and network assessments, front-end planning and validation, scope of work definition, and implementation of voice and data solutions and managed network services. "We also have the capability to use our labs as an interoperability and proof-of-concept center to create a model of the client's environment to validate our proposed solutions," explains Chris Price, director of resource development. "In addition, we are a Cisco channel partner for interactive call center technologies. Our service offerings are rounded by a dedicated managed service and technical assistance center, focused on providing application and infrastructure performance management, which in turn is driven from our implementation service offering capabilities."

NetEffect is headquartered in Atlanta and has offices in Raleigh, Washington DC, New York, Chicago, Kansas City, Dallas, Denver, San Jose and London. "We've ramped up very quickly and almost entirely on new-hire growth," says Price. "The company, which was founded in August of '98, now has 392 employees and will be looking to build its team to approximately 700 employees during the next 12 months."

Price is looking for field engineers and consultants, specializing in Voice Over X, data, security, call center technologies and unified messaging. "We need individuals capable of driving and providing true consulting services. These individuals will focus on creating, implementing and managing the performance of our clients' technical infrastructure. They not only need to be savvy with technical skills, but with an understanding of the underlying business drivers that impact our clients' businesses on a day-to-day basis. NetEffect employees will

have an impact internally as well by being given the autonomy to impact the organization and our environment," says Price. "We can comfortably demonstrate that our services offerings are on the leading edge, enabling the next generation of infrastructure technology behind the Internet. Our key to success is in identifying individuals who are capable of delivering at this level. The technical and consulting development paths at NetEffect are never ending. With so few 'perfect fit' technical skill sets available to us in the market, we recognize the need to continuously expand our employees' capabilities, not only to increase their skills and market value, but to guarantee that our organization will maintain its leading-edge capabilities, which are defined by the employees' skillsets themselves. At NetEffect, the people are the product."

PricewaterhouseCoopers New York, NY

Over the past five years, PricewaterhouseCoopers has changed dramatically, adding to the firm's extensive experience with ERP systems to offer clients expertise in strategic planning, finance, business-to-employee, customer relationship management and supply chain management. "However, the thing that truly differentiates us from other firms is our people," says Matt Hamlet, Americas recruiting leader for the management consulting practice of PricewaterhouseCoopers. "When we interview candidates, they get to meet with people they might work with, for or who will work for them — they are what sell the fact that talent and skills are what we are."

The firm works with top companies around the world. "We work on the edge, helping organizations determine what they'll look like not just a year from now, but five years from now," says Hamlet. "The result is an incredible roster of IT projects." The company offers opportunities throughout the world, and hiring is fairly equally spread across the United States. "We're hiring at all levels, from entry through managing directors and senior project managers," Hamlet adds.

Hamlet looks at resumes to distinguish those candidates who have worked in a consultative environment, who have industry expertise, as well as consulting skills, and who understand how to bring change into an organization through the use of some type of methodical approach. "The technical skills we need range from C++ to ERP," he adds.

While client projects and working with highly reputable colleges are primary reasons for joining PricewaterhouseCoopers, Hamlet says the career opportunities can't be overlooked. "We have a global capabilities framework that is our career model, allowing you to truly map out and plan your career. We invest heavily in training and education, keeping you current with technology while also supporting you as you evolve as an overall professional."

IT careers

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Sales Offices

Carol Lasker, Associate Publisher/Vice President
Debbie Lovell, National Sales Operations Manager
Internet: clasker,dlovell@nww.com
(508) 460-3333/FAX: (508) 460-1237

NEW YDRK/NEW JERSEY

Tom Davis, Associate Publisher, Eastern Region
Elisa Della Rocco, Senior District Manager
Elizabeth Ardzone, Account Executive
Aimee Jacobs, Sales Assistant
Internet: tdavis,elisas,eardzone,ajacobs@nww.com
(201) 587-0090/FAX: (201) 712-9786

NORTHEAST

Donna Pomponi, Regional Sales Manager
Kathryn Zinn, District Manager
Internet: dpomponi,kzinn@nww.com
(508) 460-3333/FAX: (508) 460-1237

MID-ATLANTIC

Jacqui DiBianca, Regional Sales Manager
Lisa Londrillo, Sales Assistant
Internet: jdibian,llandrillo@nww.com
(610) 971-1530/FAX: (610) 975-0837

MIDWEST/MARYLAND

Eric Danetz, Senior District Manager
Aimee Jacobs, Sales Assistant
Internet: edanetz,ajacobs@nww.com
(201) 587-0090/FAX: (201) 712-9786

CENTRAL

Dan Gentile, Midwest Regional Director
Gracie Vela, Sales Assistant
Internet: dgentile,gvela@nww.com
(512) 249-2200/FAX: (512) 249-2202

NORTHERN CALIFORNIA

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Miles Dennison, Regional Sales Manager
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Grant Turner, Sales Assistant
Anjanette Pike, Sales Assistant
Internet: skupiec,mdennison,lgreenberg,sweglage,lotterson,cbaglione,areyes,gturner,bboswell,apike@nww.com
(650) 577-2700/FAX: (650) 341-6183

NORTHWEST/ROCKIES

Carol Stiglic, Regional Sales Manager
Karen Weiss, Regional Sales Manager
Internet: cstiglic,kweiss@nww.com
(650) 577-2700/FAX: (650) 341-6183

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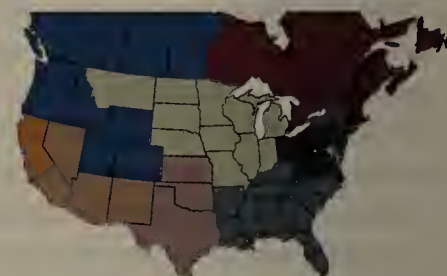
Becky Bogart Randell, District Manager
Tiffany Wortham, Account Executive
Internet: brandell,twortham@nww.com
(949) 250-3006/FAX: (949) 833-2857

SOUTHEAST

Don Seay, Regional Sales Manager
Terry Sanders, Sales Assistant/Account Executive
David Mooney, Sales Assistant
Internet: dseay,tsanders,dmooney@nww.com
(404) 845-2887/FAX: (404) 250-1646

FUSION

James Kalbach, Sales Manager
Jeff Schwartz, Account Executive
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Stephanie Gutierrez, Account Executive
Debbie Lovell, Account Executive
Kristin Baker, Fusion Coordinator/Sales Associate
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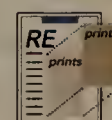


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Chris Gibney, Sales Operations Coordinator
Internet: rblack,kzannott,egubaie,cpeters,agaston,sstearns,cgibney@nww.com
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now take twice as long as they used to, and businesses get charged if they want more than 50 hits on a search. Certain types of searches that help identify professional cybersquatters — those who may purchase hundreds of trademark-related domain names — are no longer supported.

The problems with WHOIS are coming to the forefront now that the Internet Corporation for Assigned Names and Numbers (ICANN) has selected seven new top-level domains, including .biz and .info. Internet industry insiders worry that WHOIS searches will become even more time-consuming and less accurate after the new registries come online next spring unless standards are established.

WHOIS standardization is being tackled on two fronts:

and associate general counsel at Verizon Communications, which owns thousands of domain names for its Verizon, Bell Atlantic and GTE product lines.

Deutsch, who belongs to ICANN's business advisory group, says many member companies are having problems getting information out of WHOIS. "Because WHOIS has become this shared, distributed database, the information we need is often not available or it's not updated in real time," she says.

Marilyn Cade, director of Internet and e-commerce policy at AT&T, says ICANN needs to establish uniform WHOIS policies before signing contracts with the new top-level domain registries.

"From industry's point of view, ICANN should be setting the standards and requiring compliance with those stan-

VeriSign Global Registry's Web site and performs a WHOIS search to find the name of the registrar that sold the domain name. Next, the user goes to the registrar's Web site and performs a WHOIS search to retrieve the name, address, telephone number and e-mail address of the domain name owner as well as administrative and technical contacts.

"Over the years, WHOIS has evolved into the authoritative source of data on the existence and nonexistence of domain names," says Ross Rader, director of research and innovation at Tucows, a Canadian domain name registrar. "But the data is now so dispersed and so distributed, and it varies so widely from registrar to registrar, that it's very difficult to get good information out of it."

What domain name registrars want is a set of standards for how WHOIS data is presented, including what fields of information are included and in what order, as well as a common protocol for sending information between a WHOIS server and a client making a WHOIS request. Without such standards, registrars cannot create automated applications on top of WHOIS data such as user authentication services.

"The WHOIS problems are going to be exacerbated now that all these new registries were selected and are going to come up with their own protocols," says Robert Gardos, chief technology officer at Register.com, a New York domain name registrar. "Now is the time to standardize the way this thing looks."

ICANN's eight-member WHOIS committee will propose standard formats for WHOIS responses and consider other data requirements for re-establishing WHOIS searching across .com, .net and .org. But the committee wasn't chartered to discuss WHOIS policies for the new top-level domain registries.

In a Dec. 1 letter to the WHOIS committee, ICANN Vice President and General Counsel Louis Touton admitted that most registrars are offering a domain name look-up capability rather than the full set of features offered by WHOIS when it was a single database run by Network Solutions [now a VeriSign company]. Efforts must be made, Touton said, to fix the "now-broken WHOIS."

ICANN's WHOIS committee

DOMAIN NAME REGISTRATION

The Internet Engineering Task Force will host a session this week to discuss whether the international standards body should develop a generic protocol for communications between domain name registries and registrars.

VeriSign currently uses its own Registry Registrar Protocol (RRP) for all communications related to domain name registrations in the .com, .net and .org top-level domains. However, RRP has been criticized for being so streamlined that it lacks a secure transfer mechanism and advanced functionality.

Demand for a new domain name registration protocol has risen following the recent selection of seven new top-level domains by the Internet Corporation for Assigned Names and Numbers. All of the registries for these new top-level domains have proposed different communications protocols than RRP.

Domain name registrars are concerned that having multiple registration protocols will be difficult and expensive to support.

"To registrars, it's a very dangerous idea to think of seven new top-level domains requiring seven new RRP's," says Ross Rader, director of research and innovation at Tucows, a Canadian domain name registrar. "We'd like to start work on a common RRP. We hope we can quickly come up with a new standard."

VeriSign engineers have developed a new version of RRP that they will demonstrate at the IETF session. The new protocol, called the Extensible Provisioning Protocol (EPP), is based on XML and has been published as a draft document by the IETF.

"VeriSign's EPP draft is pretty interesting," says Rick Wesson, an IETF participant and the president of Alice's Registry, which sells software to domain name registrars. "It takes care of a few of the problems that we've had with RRP. . . . And it can be used to provision all kinds of different services. It's much more flexible than RRP."

Domain name registrars are hopeful that the IETF will form a working group to develop a generic domain registration protocol.

"We're now in a situation where all these new commands are going to have to be added to RRP, and a bunch of new registries are all going to do it their own way," says Robert Gardos, chief technology officer at Register.com, a New York domain name registrar. "What we need is a baseline set of commands that are standard."

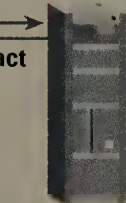
— Carolyn Duffy Marsan

How WHOIS works

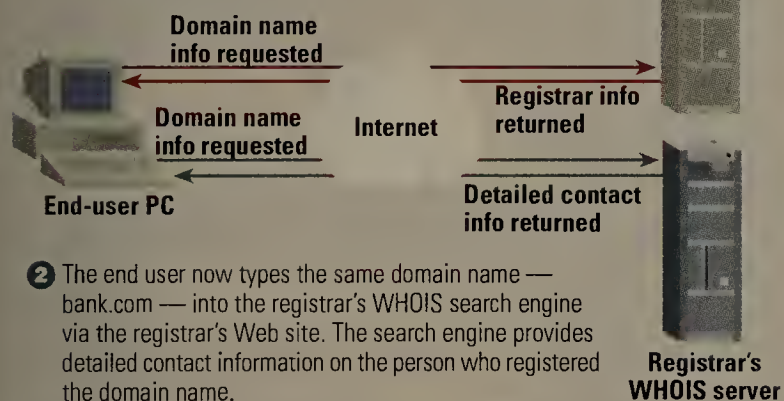
WHOIS uses a two-step approach to searching:

- 1 An end user enters a domain name — such as bank.com — into the VeriSign Global Registry Services WHOIS search engine via the VeriSign Web site. The VeriSign WHOIS server provides basic contact information, including the name and URL of the registrar that sold that domain name.

VeriSign
WHOIS server



Registrar's
WHOIS server



- 2 The end user now types the same domain name — bank.com — into the registrar's WHOIS search engine via the registrar's Web site. The search engine provides detailed contact information on the person who registered the domain name.

- ICANN last week released information about an industry advisory committee that was established to consider standard data formats for WHOIS.

- The Internet Engineering Task Force (IETF) will host a session on WHOIS protocols Thursday at a meeting in San Diego.

WHOIS standardization would be a boon to large companies that own hundreds of domain names by making it easier to monitor the use of their trademarks globally across the Internet.

"We're very supportive of any changes to WHOIS that will make it more robust," says Sarah Deutsch, vice president

dards so that when the new top-level domains are awarded, the WHOIS systems are built to the standards," says Cade, who also belongs to ICANN's business advisory group.

Cade says ICANN should ensure that the new top-level domain registries offer free WHOIS searches and that buying a copy of a registry's entire WHOIS database doesn't exceed the \$10,000 fee charged for .com, .net and .org.

WHOIS is a distributed database system that provides contact information for the person or organization that owns a domain name. Users access the information through a two-step process. First, a user visits

is expected to complete its recommendations in a few months.

Meanwhile, the IETF is hosting a birds-of-a-feather session to consider the status of the WHOIS protocol and whether new features should be added. The WHOIS protocol uses Port 43 to send text-based information in response to a WHOIS query. Among the WHOIS protocol enhancements that will be discussed are having a fixed set of minimal data, tagging data and allowing data subsets.

"WHOIS is a centralized

lookup mechanism. It doesn't really have any advanced controls such as access controls or user controls, nor does it have any sort of navigation capabilities," says Mark Kosters, vice president of research at VeriSign and a member of ICANN's WHOIS committee.

VeriSign has developed a WHOIS prototype using Lightweight Directory Access Protocol (LDAP) to provide these advanced features. Available since September, the LDAP WHOIS prototype will be

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SBC,
continued from page 1

Over the past few weeks, Ameritech has been sending postcards to thousands of residential users in Ohio and Illinois asking them to consider selling rights-of-way on their property to Ameritech. In addition, the carrier has made the same request throughout its five-state region to users inquiring online about DSL availability.

Ameritech needs the space to extend asymmetric DSL-capable loop lengths to customer locations situated more than 12,000 feet from central offices. SBC announced in October 1999 that its operating units would install a total of 25,000 remote terminals in what it dubbed Project Pronto, aiming to be the first carrier to make DSL a nearly universal remote-access option for small-office, telecom-

addresses and an 800 line operated by the Project Pronto Right-of-Way Support Team, as proof that SBC has allowed Ameritech to fall behind on network improvements.

Others maintain that officials from Texas-based SBC were unpleasantly surprised by the state of Ameritech's network, and underestimated the amount of work needed to extend DSL availability to 80% of Ameritech's territory, as SBC has promised for all its regions. Under Project Pronto, SBC operating units run fiber directly from central offices to neighborhood terminals mostly outfitted with Alcatel ADSL line cards, which then connect to customer locations over short copper loops.

"Ameritech was a house of cards," says James Carlini, president of Carlini & Associates, a telecom consulting firm in Hinsdale, Ill. Under former

■ "Ameritech was a house of cards [and] was always falling behind everyone else."

James Carlini, president, Carlini & Associates

muter and extranet sites.

But Ameritech's move a year later to solicit remote-terminal space from customers has fallen in the middle of an Ameritech customer-service crisis that recently led SBC CEO Ed Whitacre to apologize (www.nwfusion.com, DocFinder: 2148).

Some users and consultants in the Midwest point to the solicitations, which direct property owners to e-mail

Ameritech CEO Richard Notebaert, he says, "Ameritech was always falling behind everybody else" and consistently failed to run the fiber that SBC now needs for Project Pronto.

Some Ameritech employees claim they've personally seen Whitacre lash out at what he found after SBC took over Ameritech in October 1999.

'Held together by duct tape'

mechanism for searching every WHOIS data field is possible. But politically that may not be desirable and could be illegal," says Paul Kane, CEO of uwhois.com, a universal WHOIS searching capability available free on the Web. "If one is a registrar anywhere in the world holding information on a European subject, that person has a right to privacy and there are significant penalties associated with disclosure... Yet the ICANN accreditation agreement says you must disclose the information."

Kane says ICANN needs to "move with due caution" to address national privacy concerns in establishing WHOIS standards and possibly modify-

ing its accreditation process.

The privacy concerns surrounding WHOIS may discourage ICANN and the IETF from being too aggressive about WHOIS standards, despite demands from domain name registrars and corporate users.

"WHOIS is fraught with politics," Kusters says, pointing out that the IETF held a session on WHOIS standardization two years ago that "never really took off." ■

Learn more about SBC's DSL efforts

Hear a recording from Ameritech's Project Pronto Right-of-Way Support Team: **1-800-667-5611**

Try Ameritech's on-line DSL availability tool and perhaps get an offer of compensation for rights-of-way at your house: **www.ameritech.net/visitors/speedpath/avail_frm.html**

See the current Project Pronto DSL neighborhood gateway rollout schedule (downloadable into Microsoft Excel): **www.sbc.com/PublicAffairs/PublicPolicy/pronto_gateways/**

"When Whitacre visited and saw the condition of my building, with duct tape holding carpet together, he asked, no less than six times, 'What did you all do with the money?' " says one recently retired Ameritech employee in Southfield, Mich. "Our only honest answer was: 'Dick [Notebaert] didn't spend a dime because he wanted you to buy us.' "

Ameritech spokespeople insist that the company's main DSL goal this year has been to install DSL gear in additional central offices. They say the company will move aggressively to remote-terminal buildouts next year. Indeed, a regulatory document filed on SBC's public-policy Web site lists a detailed spreadsheet of remote-terminal installations in all five Ameritech states in the next year (see graphic).

But another Chicago-area consultant says he was told in an April conference call for telecom consultants that DSL was proceeding on a faster track. "I have wanted it at home ever since, [but] it's not available until they extend the fiber remotes into my area," says John Thompson of consultancy

Thompson, Ross & Associates.

Thompson got the postcard soliciting remote-terminal space at his home a few weeks ago. He replied by e-mail and was told his request was forwarded to another department. He still doesn't know the status of his application to sell property to the carrier. He relates the resulting uncertainty to his clients' recent experience ordering Ameritech services.

"It often seems that no one at Ameritech knows what is going on anymore," Thompson says in a posting on Network World Fusion. "We have clients with lost orders, late orders and a consistent pattern of delays in the installation of the local loops for CLEC and carrier connections."

Some observers say Ameritech doesn't have a handle on which central offices provide DSL services even within ordinary ADSL distance restrictions.

Jonathan Goldman, policy director for the Illinois Citizens Board, cites one customer who waited five months for DSL service sold to him by an Ameritech telemarketer, only to have the order canceled by Ameritech when it finally realized it couldn't reach the user.

"How do you sell someone a service that you can't provide and then take five months to figure out that you can't provide it?" Goldman asks. Citing chronic delays with DSL and regular phone line installations, he adds: "Ameritech just doesn't have the loops out there."

Volunteer some space

For those users who've been asked to help the phone company get back on track, the front of the postcard contains the teaser, "Are you ready to move into the fast lane?" along with an 800 number. On the reverse it says: "Help bring the future to your neighborhood."

Those who call hear a recorded female voice that says "at Ameritech we put our customers first." The voice then asks for contact information and says volunteers will be contacted by an engineering department "if Ameritech can use your location." Only then will the engineering department discuss the amount of money and easement size, the statement continues.

SBC's Southwestern Bell unit does not solicit customer easements for Project Pronto, says a company spokeswoman, while its Pacific Bell unit sends out a "limited number" of letters seeking rights of way.

"We actually have a majority of the rights of way that we need," she says. "Different regions are taking different approaches to going about getting the remaining rights of way that we need." ■

Get more information online.
DocFinder: 2148

www.nwfusion.com

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demonstrated at the IETF session.

"With the access controls built into LDAP, you can authenticate various classes of users and allow more privileged classes of users to see things that others can't," Kusters says.

Having advanced features such as access control is becoming more important as countries such as Argentina and Ireland seek to limit WHOIS information access because of privacy concerns. U.S. companies, on the other hand, want WHOIS to remain a free and open system.

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Cisco,
continued from page 1

ecosystem to accelerate a market we care about. We will be surgical in going into the ecosystem and up the [protocol] stack" toward the middleware and application [market]. "Service control and communications services are two components of Cisco's Architecture for Voice, Video and Integrated Data [AVVID], a scheme that Cisco now says is a reference framework for building voice, video, security, and content-enabled fixed and mobile e-businesses. AVVID initially was a blueprint for converged voice, video and data networks when it debuted 15 months ago (www.nwfusion.com, DocFinder: 2152).

"There's huge opportunity for breakaway created by the AVVID reference architecture," says James Richardson, senior vice president of Cisco's Enterprise line of business, referring to the company's plan to separate itself from competitors including Nortel Networks, Lucent, Siemens and Alcatel.

Service control and communications services handle such tasks as VPN security, call control, quality of service, policy and directory control, unified communications and collaboration. These two aspects of the AVVID architecture are the "next billion-dollar markets" for Cisco, Richardson says.

Cisco has already invested \$4.3 billion to acquire several software companies — including GeoTel and SightPath — to

fill in some components of its service control and communications services suite. Cisco will invest billions more in research and development to fill out the AVVID architecture to address lucrative opportunities in VPNs, voice, security, content and wireless networking, Richardson says.

In so doing, Cisco will enter competitive situations with companies that are now or could be joint marketing business partners, analysts say.

"I think they'll run smack dab into a whole bunch of companies in content delivery," says Frank Dzubeck, president of Communications Network Architects, a consultancy. "There's so much overlap as

you move up the stack that's more difficult to control. You worry about ownership of goods. They're going to compete with software companies, ASPs and ecosystem partners."

"Software is where the differentiation comes in," says Tere Bracco, an analyst at Current Analysis. "If you look at the ecosystem partners, the phrase 'We both compete with and complement Cisco' has sort of become boilerplate in media kits. Now that Cisco's playing more heavily in [software] they're just going to compete with ecosystem partners on more points and complement them perhaps on fewer."

Bracco says Cisco's push up the stack does not threaten to disassemble the company's partnerships, however. Even if they complement the networking giant on fewer and

CISCO CEO JOHN CHAMBERS LOOKS AHEAD



Cisco CEO John Chambers took a few moments last week at the company's annual analyst conference to share some thoughts with

Network World Senior Editor Jim Duffy, including the company's plan to move more aggressively into the software market.

Will sales into the enterprise and commercial markets be enough to offset slowing growth in service provider capital expenditures?

We are not immune to changes but are buffeted differently than competitors, including in demand creation. We're not as affected as players on the edge of these markets. Their decisions to exit the enterprise market is a short-term approach. Enterprises are not outsourcing at the rate people thought they would.

How will you adjust your financing through Cisco Capital in light of slowing growth in carrier spending and the shakeout in the CLEC ranks?

We finance not as a subsidy for sales but as a means to help new markets grow. We will continue to be more conservative than our peers but there is risk involved. We'll also be more selective in terms of a customer's path to profitability, growth and competition.

Is the charter of the Internet Business Solutions Group to push the AVVID architecture, and follow-on Cisco products, into enterprises?

It's to show how applications can be applied to change the process. It's not to push AVVID but to convert enterprises to new e-businesses. It's to help customers do this.

Which of your competitors are you watching most closely? Who's executing the best?

I like all of my competitors. I like all the CEOs at all of them. But this is where Cisco has been unbelievably lucky. There's no substitute for luck. It was a tremendous gift that vendors exited the enterprise market.

But we tripped because Juniper's been more aggressive. We didn't market effectively. They out-marketed us this last year. But [in high-end routing] where are Lucent, Nortel,

Alcatel and Siemens? Our target market share is 40% to 70%. You'll see us be more effective in marketing the high end.

Does your plan to move higher up the stack put you into more of a competitive situation with existing and potential partners?

We will play in the middleware area. We listen to what our customer needs are. We will first partner, or we may participate and then play. Or it may be a combination of all of the above. We don't strategically partner and then compete. We will compete to an extent. There's a natural gray area where there will be overlap.



EDWARD CALDWELL



Cisco will invest billions more in research and development to fill out the AVVID architecture to address

lucrative opportunities in VPNs, voice, security, content and wireless networking.

James Richardson, senior vice president of Cisco's Enterprise line of business

fewer features, just being associated with the Cisco name is money in the bank, she says.

Some partners did compete with Cisco to a certain extent in the past, but now expect to compete more.

"That is not unusual in our industry, particularly as the voice and data services are converging," says Mary Sullivan, director of market-

ing communications for Priority Call. "Perhaps in 2001, 2002 we will see more [competition]."

Dzubeck thinks Cisco will look to add more network usage billing and accounting capabilities to its hardware, beyond what it already delivers with its NetFlow technology.

Xacct Technologies in Santa Clara is an ecosystem partner of Cisco's that develops billing and accounting software. Xacct welcomes Cisco's push higher up the stack.

"I view this as a very positive step from Cisco because

until very recently, it was very frustrating for us to get any mind share in the sense that they just didn't want to think outside the box," says Anil Uberoi, senior vice president of marketing and business development at Xacct. "At least now, I finally get to talk to some people at Cisco that value this [software] function. Our challenge is to stay at the top of that curve so they don't have any reason to look around." ■

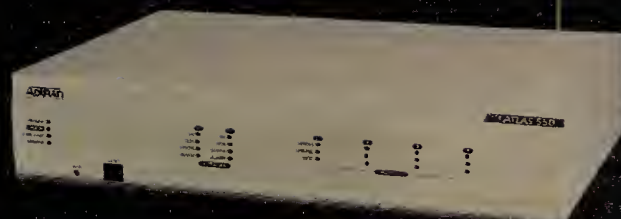
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Love all. Trust a few. Do wrong to none.

— William Shakespeare

Trust is a curious thing. In most cases, trust is as much an emotional judgment as an objective assessment of someone's worthiness in some situation.

In the real world, establishing trust is something we expect to take time, something developed through familiarity and experience, and tested in interaction and results. Years ago I read that when you meet someone you make up your mind about that person within the first 5 seconds and do so, to all intents, permanently.



MARK
GIBBS

Not surprisingly, establishing trust online is a whole different can of worms. Online the clues are missing. There's no opportunity to press flesh and see people's expressions, no way to pick up the nuances of gesture and voice that are evaluated in the blink of an eye through the experience of a mil-

lion years of evolution.

This problem was dealt with in the legendary product Pretty Good Privacy (PGP) through the concept of a "web of trust." PGP is a system for encrypting data (messages, files — pretty much any digital content) using strings of numbers called "keys." The data is accessible to only the sender and the recipient, and each party can establish the identity of the other party. This leads to interesting features such as the ability to ensure that the sender can't repudiate a message or other content once sent.

Of course, the problem here is that the core of the system is the keys, and to know that a particular key belongs to a specific person requires that either you meet that person and he gives you a copy of his key or someone else you trust — who in turn trusts the person you are trying to authenticate — verifies that person's key.

So to make it possible for some-

one else to confirm your identity, you have to get him to "sign" your key and, of course, you sign his. And once you've done this with a few people, you and they become part of what is called a "web of trust" (see www.rubin.ch/pgp/weboftrust.en.html and <http://bcn.boulder.co.us/~neal/pgpstat/>).

This is good, but still rather technical. Moreover, all the PGP web of trust says about the people involved is that the key that they claim is theirs, really is theirs. Wouldn't it be nice to be able to find out more about someone, such as are they a reliable judge of good music, is their opinion on software useful, or do they know what they are talking about in their wine-tasting notes?

This is the territory of a few online services that aim to create webs of trust for a broader range of topics. I've been looking at one of the entrants in this market, RepCheck (www.repcheck.com).

The idea behind RepCheck (a free service at present) is that members, who are verified through credit card checks, score each other on attributes that include trustworthiness, respect, honesty, responsibility, compassion and creditworthiness.

What an interesting idea. In theory, I can look you up and see whether other people think you are honest and do business with you accordingly (note that you can rebut negative comments).

The key to RepCheck working well will be to get as many people registered as possible so opinion is "averaged out" — preventing one person from destroying or over-inflating your reputation. This also requires that if you sign up, you start rating other people to get the network going.

RepCheck plans to make money from licensing its technology and adding premium services in the future. I think this is a fascinating and valuable idea, but I think that given the current level of paranoia about online privacy, it could be hard to jump-start the site.

Tell me what you think, then sign up and rate me. I can take it. I trust you.

Send the thrust of your trust to nurcolumn@gibbs.com.

'NET BUZZ



The latest on the
Internet industry

Not everyone angling to cash in on the wireless mania has his or her head in the clouds . . . although it certainly seems that way at times.

A positive case in point is **Christopher Herot, CEO at MessageMachines**, a tiny Boston start-up that's focused squarely on selling practical communications services to providers of the kinds of business applications that are likely to generate real revenue. Herot used to be an executive at Lotus, where — despite jokes about its home office being in the People's Republic of Cambridge — making money has always mattered.

"What we're building here is a real-time messaging [service] that connects together all these various forms of short-text messages, like instant messaging, Short Message Service, [Wireless Application Protocol], phones, e-mail, all that stuff," Herot says. "In the larger sense, we're trying to become the Switzerland that makes these things work together because they all exist in their own private little universe right now."

What's refreshing is to hear Herot talk about the specific wireless applications that customers are asking MessageMachines to help enable. For example, one that helps oil companies gain an edge when bidding on crude, and another that lets doctors access patient and drug information while away from a PC.

"There's a certain discipline that you get from going and talking to venture capitalists," Herot says. "You realize that you had better be able to explain who is going to pay for your service if you want to raise money. Attracting a bunch of subscribers and then advertising to them doesn't play on Sand Hill Road anymore."

Here's an interesting coincidence: Hours after reading about **Apple** warning Wall Street to expect disappointing earnings, I received an e-mail from a thoroughly disappointed Apple customer:

"I've recently had the pleasure of ordering an online download copy of iMovie 2 from Apple from their AppleStore using the oh-so-convenient one-click shopping method," writes **Chuck Crannell**. "The method is apparently a bit too successful since the Java script looped and ordered 109 copies for me! I was unable to download even one copy since none of the orders ever generated an order confirmation screen."

No problem, right? Software happens, and this is one reason online retailers have customer-service departments.

"I contacted Apple Customer Support," Crannell continues, clearly warming up to the storytelling. "They were pleasant but totally incapable of canceling any of the 109 orders until each one was credited against my account. I was also told to submit a copy of their 'download refund form' for EACH order once they were processed and approved."

In the retail business, this is known as punishing the customer.

"Gee, at \$50 a copy, this is quite the credit card bill," Crannell continues. The total was \$5,450. "And I totally appreciate having a credit card limit wiped out during the holiday buying season. . . . Merry Christmas and Happy New Year, Apple!"

Happy holidays to you, Chuck, and thanks for sharing.

What does HomePortfolio.com have in common with **Mark Twain**? . . . Reports of its death have also been exaggerated.

And while I had nothing to do with any premature eulogies for Twain, the same cannot be said of HomePortfolio, whose passing was erroneously reported here Nov. 13 (and elsewhere, they tell me) in an item about **Furniture.com**, which actually is deader than a three-piece sectional.

HomePortfolio, which bills itself as "the leading Internet destination for the best in home design," can be seen alive and apparently well at www.homeportfolio.com.

Twain also said, "It were not best that we should all think alike; it is difference of opinion that makes horse races." Feel free to express yours; the address is buzz@nww.com.



PAUL
MCNAMARA

WHO'S HELPING CENDANT SET A WHOLE NEW STANDARD FOR GLOBAL CUSTOMER SERVICE AND CRM?



In a move aimed at setting a new standard in customer relationship management (CRM), Cendant—owner of sector-leading brands including Days Inn®, Howard Johnson®, Ramada® and Avis®—awarded an eight-year global-outsourcing contract to AT&T Solutions, the professional services arm of AT&T Business.

Under the agreement, AT&T Solutions will assist Cendant in e-Enabling and transforming their customer-contact-center infrastructure to a world-class level, and provide an integrated portfolio of network services. The trailblazing effort will provide Cendant customers with interactive access to multimedia-enabled e-Contact centers, and allow Cendant to capture, store and correlate customer contact information, manage customer relationships across brands, and capitalize on cross-brand synergies.

Guy Gray, Senior Vice President of Contact Centers and Telecommunications for Cendant, stated, "By introducing AT&T Solutions' networking and contact-center management skills, we're setting the stage for Cendant companies to provide customers an entirely new, incredibly rich contact experience. We have every expectation that this transformation will enable Cendant companies to continue setting a global standard for customer service."

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